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Cameron's Steam Pumps.

THESE pumps have made for themselves so high a reputation, and have come so largely into use, that good illustrations and a clear description of their mechanism cannot fail to be of interest. These pumps, though used for a variety of purposes, are constructed on the same principle, and are all equally efficient and simple, so that, when the construction and operation of one is fully understood, there is no difficulty in seeing that it is an excellent one for all the purposes to which it has been applied.

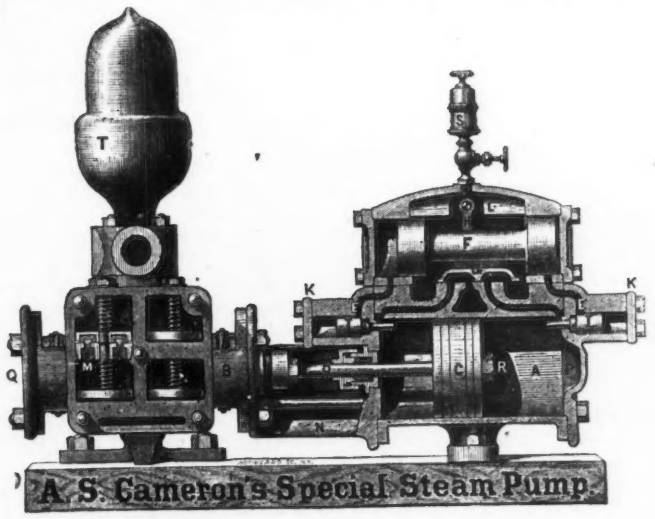

Fig. 1.

FIG. 1 represents a section of one of these pumps; A, is the steam cylinder shown in section; C, the steam piston; D, the piston-rod; L, the steam-chest; F, the plunger; G, the slide-valve; H, a starting-bar connected with a handle on the outside; I, I, are the reversing valves; and K, K, the bonnets over the reversing valves; N, is the body-piece connecting the steam and water cylinders; B, is the water cylinder, with the valve chest bonnet removed; M, is a valve seat shown in section—the valve over it is also shown in section; T, is the discharge air-vessel. To illustrate the operation of the pump, suppose the steam piston, C, moving from right to left; when it reaches the reversing valve, I, it opens it, and exhausts the space on the left-hand end of the plunger, F, by the passage, E, which leads to the exhaust-pipe; the greater pressure inside of the steam-chest changes the position of the plunger, F, and slide valve, G, and the motion of the piston, C, is instantly reversed. The same operation, repeated at each stroke, makes the motion continuous. The reversing valves, I, I, are closed by a pressure of steam on their larger ends, conveyed by an unseen passage direct from the steam-chest. When a pump is first connected, remove the bonnets, K, K, and valves, I, I, and blow steam through to remove any dirt or chips that may have lodged in the pipes; then clean and replace them. Should a pump stop on one end while in operation, remove the reversing valve on the other end, clean and replace it.

FIG. 2 represents a pump arranged for mining operations. In sinking a shaft by the use of steam-power for pumping, it is customary to fasten the pump by bolts and screws to the timbers as near as possible to the bottom of the shaft, and work it in that position as long as it would continue to draw the water. As water can be raised only a little over thirty feet by suction, this necessitates frequent changes, requiring both time and money. In wet mines the time lost is of immense importance, as the shaft begins to fill rapidly as soon as the pumping ceases, and if the operation be a long one, the water will have gained so much that it will be impossible to lower the pump sufficiently. The pump illustrated is designed to obviate this difficulty in a way apparent at the first glance at the engraving. The pump is merely hung in the shaft, and can be easily raised or lowered by the block and fall shown in the cut. The pump itself does not differ in design from the one represented in FIG. 1, and being complete in itself, and intended to work vertically, does not need to be attached to any support. The space which it takes up in the shaft is merely that required for the cylinders, and no more. When a flexible steam connection is used, it is only necessary to lower the pump by means of the blocks or windlas by which it is suspended. When the use of a flexible connection is deemed unadvisable, a flanged pipe can be used, the lengthening and shortening of which can be quickly accomplished.

FIG. 3 shows the pump alone, on a larger scale than FIG. 2. To practical men, conversant with the rugged experience of mining operations, the value in some instances of a simple contrivance of this kind will be at once apparent, while there can be no doubt as to its labor-saving qualities, which are of universal application.

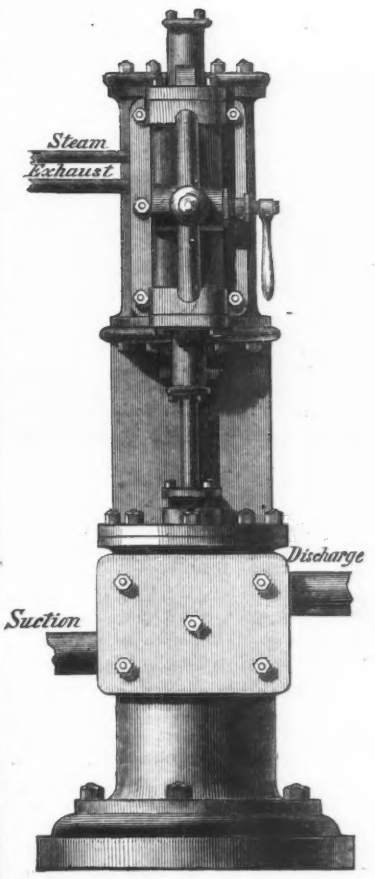

Fig. 3.—Enlarged View of Pump.

The Yellowstone Expedition.

[From the Notes of Hon. H. D. WASHBURNE, Surveyor General of Montana.]

As your readers are aware, the Yellowstone Expedition left Fort Ellis on the 22d of August, through the Bozeman Pass, finding it all that the Bozemanites claim for it—easy and practicable—and camped for the first night on Trail creek, having a fine view of the mountains beyond the Yellowstone. The next day they struck the valley, and their journey up the river commenced. They camped for the night at the ranche of Mr. BOTTLER, the last settler up the river. Crow Indians were quite plenty during the day, and a heavy rain at night gave anything but a pleasing aspect to the commencement of the trip; but a bright sun, about ten o'clock, made everything right, and we moved to the cañon of the river, about fourteen miles distant, and camped on one of the loveliest spots in Montana. Two small streams put in from the east from an elevation near camp. The river and valley can be seen stretching away far to the north, the river bank plainly defined by the trees skirting its margin. South, the river can be seen pouring through the cañon, while far away to the east and west the mountain peaks were then covered with snow, the setting sun brightening both in its last rays, before night's mantle was thrown over the party.

We passed through the cañon next morning, and found it about six miles long, the trail leading us along the side of the torrent, and sometimes hundreds of feet above it. Night found us at the mouth of Gardiner river, a fine mountain stream coming from the south, and entering the Yellowstone just below the Grand Cañon, over thirty miles in length and nearly equally divided by the east fork. The cañon proving impracticable, we took to the mountains, camping one night in them, and the next night a few miles above. The river runs for sixteen miles in nearly a due west course here. Our camp was on a fine stream coming in from the opposite side of the east fork. and designated by us as Tower creek. The camp was called Camp Comfort. Game and trout were abundant. We found here our first hot springs, small but attractive, and of five or six different kinds—sulphur, iron, etc. This cañon of the river is grand. Basaltic columns of enormous size are quite numerous. But the great attraction here was the falls on the creek, near our camp. The stream is about as large as the Prickly Pear, and for a mile rushes down with fearful velocity. It seems at some time to have been checked by a mountain range, through which it has torn its way, not entirely removing the barrier, but tearing through, leaving portions still standing; and these, by the elements, have been formed into sharp pinnacles. Looking from the cañon below, it appears like some old castle with its turrets dismantled but still standing. From between two of these turrets the stream makes its final leap of one hundred and ten measured feet, and then, as if satisfied with itself, flows peacefully into the Yellowstone. We attempted to compare it with the famous Minnehaha, but those who had seen both said there was no comparison. It was not as terrible in its sublimity as Niagara, but beautiful and glo-

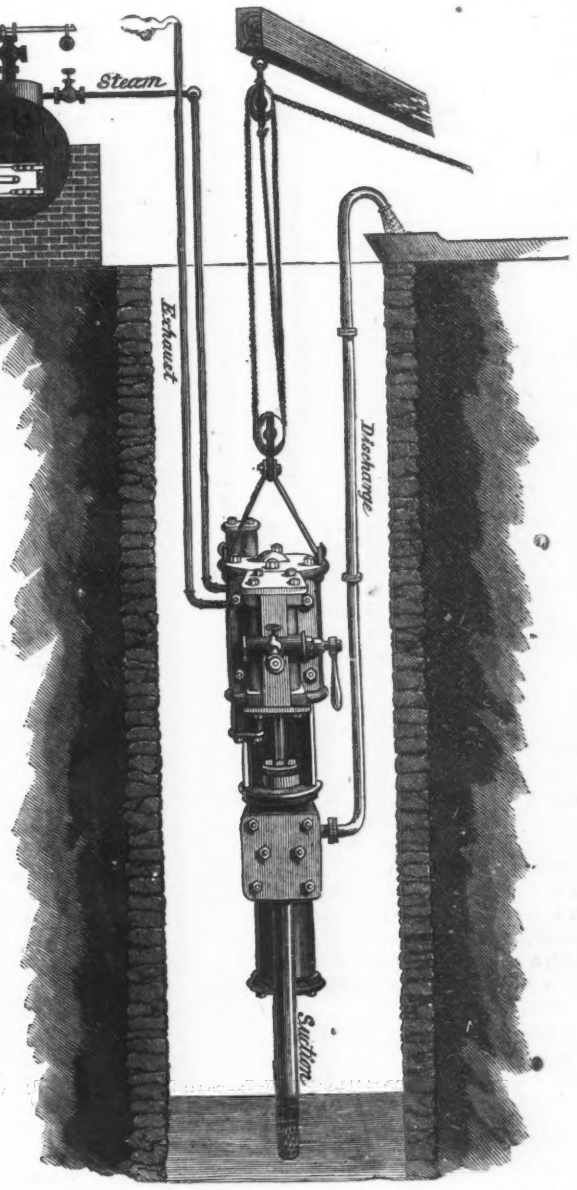

Fig. 2.—Arranged for Sinking and Recovering Vertical Shafts.

rious. You felt none of the shrinking back so common at the great fall, but rather, as you stood below and gazed upon its waters broken into white spray, you felt as though you wanted to dash into it and catch it as it fell. By a vote of the majority of the party this fall was called Tower Fall.

The cañon of the main river here runs in a south-west direction. The party crossed over a high range of mountains and in two days reached the Great Falls. In crossing the range, from an elevated peak a very fine view was had. The country before us was a vast basin. Far away in the distance, but plainly seen, was the Yellowstone lake. Around the basin the jagged peaks of the Wind river, Big Horn, and Lower Yellowstone ranges of mountains, while just over the lake could be seen the tops of the Tetons. Our course lay over the mountains and through dense timber. Camping for the night eight or ten miles from the falls, we visited some hot springs that, in any other country, would be a great curiosity, boiling up two or three feet, giving off immense volumes of steam, while their sides were encrusted with sulphur. It needed but a little stretch of imagination on the part of one of the party to christen them "Hell-broth Springs." Our next camp was near the Great Falls, upon a small stream running into the main river between the upper and lower falls. This stream has torn its way through a mountain range, making a fearful chasm through lava rock, leaving it in every conceivable shape. This gorge was christened the "Devil's Den." Below this is a beautiful cascade, the first fall of which is five feet, the second twenty feet, and the final leap eighty-four feet. From its exceedingly clear and sparkling beauty it was named "Crystal Cascade."

Crossing above the upper falls of the Yellowstone, you find the river one hundred yards in width, flowing peacefully and quiet. A little lower down it becomes a frightful torrent, pouring through a narrow gorge over loose boulders and fixed rocks, leaping from ledge to ledge, until, narrowed by the mountains and confined to a space of about eighty feet, it takes a sudden leap, breaking into white spray in its descent, a hundred and fifteeen feet. Two hundred yards below, the river again resumes its peaceful career. The pool below the falls is a beautiful green, capped with white. On the right-hand side a clump of pines grow just above the falls, and the grand amphitheatre, worn by the maddened waters on the same side, is covered with a dense growth of the same. The left side is steep and craggy. Towering above the falls, half way down and upon a level with the water, is a projecting crag, from which the falls can be seen in all their glory. No perceptible change can be seen in the volume of water here from what it was where we first struck the river. At the head of the rapids are four apparently enormous boulders, standing as sentinels in the middle of the stream. Pines are growing upon two of them. From the upper fall to the lower there is no difficulty in reaching the bottom of the cañon. The lower falls are about half a mile below the upper, where the mountains again, as if striving for the mastery, close in on either side, and are not more than seventy feet apart. And here the waters are thrown over a perpendicular fall of three hundred and fifty feet. The cañon below is steep and rocky, and volcanic in its formation. The water, just before it breaks into spray, has a beautiful green tint, as has also the water in the cañon below. Just below, on the left hand side, is a ledge of rock, from which the falls and cañon may be seen. The mingling of green water and white spray with the rainbow tints is beautiful beyond description.

The cañon is a fearful chasm, at the lower falls a thousand feet deep, and growing deeper as it passes on, until nearly double that depth. Jutting over the cañon is a rock two hundred feet high, on the top of which is an eagle's nest which covers the whole top. Messrs. HAUSER, STICKNEY and Lieutenant DOAN succeeded in reaching the bottom, but it was a dangerous journey. Two and a half miles below the falls, on the right, a little rivulet, as if to show its temerity, dashes from the top of the cañon, and is broken into a million fragments in its daring attempt.

After spending one day at the falls we moved up the river. Above the falls there is but little current, comparatively, for several miles, and the country opens into a wide, open, treeless plain. About eight miles from the falls, and in this plain, we found three hills, or rather mountains, thrown up by volcanic agency, and consisting of scoria and a large admixture of brimstone. These hills are several hundred feet high, and evidently are now resting over what was once the crater of a volcano. A third of the way up on the side of one of these hills is a large sulphuric spring, twenty feet by twelve, filled with boiling water, and this water is thrown up from three to five feet. The basin of this spring is pure solid brimstone, as clear and bright as any brimstone of commerce. Quite a stream flows from the spring, and sulphur is found encrusting nearly everything. Near the base of the hills is a place containing about half an acre, but covered with springs of nearly every description—yellow, green, blue and pink. Flowing from the base of the hill is a very strong spring of alum water; not only alum in solution, but crystallized. This place we called Crater Hill, and as we passed over, the dull sound coming from our horses' feet as they struck, proved to us that it was not far through the crust. All over the hill were small fissures, giving out sulphurous vapors. The amount of brimstone in these hills is beyond belief.

Passing over the plain, we camped on the river bank, near a series of mud springs. Three of the largest were about ten feet over the top, and had built up ten or twelve feet high. In the bottom of the crater thus formed thick mud was boiling and bubbling, sputtering and splashing, as we have often seen in a pot of hasty pudding when nearly cooked. Near these we found a cave under the side of the mountain, from which was running a stream of clear but very hot water. At regular intervals the steam was puffing out. For some time we had been hearing a noise as of distant artillery, and soon we found the cause. Some distance above the level of the river we found the crater of a mud volcano, forty feet over at its mouth. It grew smaller until at the depth of thirty feet, when it again enlarged. At intervals a volume of mud and steam was thrown up with tremendous power and noise. It was impossible to stand near, and one of the party, Mr. HEDGES, paid for his temerity in venturing too close by being thrown backward down the hill. A short time before our visit mud had been thrown two or three hundreed feet high, as shown by the trees in the vicinity. Not far from this we found our first geyser. When discovered it was throwing water thirty or forty feet high. The crater was funnel-shaped, and seventy-five by thirty-five feet at its mouth. We stayed and watched it one day. Without warning it suddenly ceased to spout, and the water commenced sinking until it had gone down thirty feet or more. It then gradually commenced rising again, and three times during the day threw up water thirty or forty feet.

The next day we re-crossed the river and succeeded in reaching the lake, and camped on the lower end. The fishing, which had been good all the way up the river, proved remarkably so in the lake. Trout from two to four pounds were to be had for the taking. Flies proved useless, as the fish had not been educated up to that point. Remaining over Sunday, we took up the line of march around the south side of the lake, which took us through a dense growth of pine, filled with fallen timber. The third day's march was over a mountain, and but little progress was made, the train going into camp about two o'clock. Mr. EVERTS failed to come into camp, but this occasioned no uneasiness, as we had all expected to reach the lake and believed he had pushed on to the lake, as he had once before done, and was awaiting our arrival. Moving on five miles, we struck an arm of the lake, but found no trace of him. A party was sent down the shore, and two other parties to climb the adjacent mountains, to search for him, and to build fires on them to attract his attention. Next morning, no news being heard of him, a council was held and the camp moved to the main lake, and search commenced vigorously, but without avail. The fourth night a snow storm commenced and continued for two days, rendering the search during that time impossible. The situation of the party was becoming precarious; away from the settlements, no trail, without a guide, and snow covering the ground. Another council was held, and it was determined that it was best to move towards the settlements. Mr. GILLETTE volunteered to stay and prolong the search, and two soldiers were left with him. Mr. GILLETTE is one of the best mountain men of the party, and there is hope that he may bring some tidings of the missing man. On the south end of the lake is a very beautiful collection of hot springs and wells; in many the water is so clear that you can see down fifty or a hundred feet. The lake is eight thousand feet above the level of the sea, a beautiful sheet of water, with nnmerous islands and bays, and will in time be a great summer resort; for its various inlets, surrounded by the finest mountain scenery, cannot fail to be very popular to the seeker of pleasure, while its high elevation and numerous medicinal springs will attract the invalid. Its size is about twenty-two by fifteen miles.

Leaving the lake, we moved nearly west, over several high ranges, and camped in the snow amid the mountains. Next day, about noon, we struck the Fire Hole river, and camped in Burnt Hole valley. This is the most remarkable valley we found. Hot springs are almost innumerable. Geysers were spouting in such size and number as to startle all, and are beyond description. Enormous columns of hot water and steam were thrown into the air with a velocity and noise truly amazing. We classified and named some of them according to size:

No. 1. The Giant, seven by ten feet, throwing a solid column of water from eighty to one hundred and twenty feet high.

No. 2. The Giantess, twenty by thirty, throwing a solid column and jets from one hundred and fifty to two hundred feet high.

No. 3. Old Faithful, seven by eight, irregular in shape, a solid column each hour, seventy-five feet high.

No. 4. Bee Hive, twenty-four by fifteen inches, stream measured two hundred and nineteen feet.

No. 5. Fan Tail, irregular shape, throwing a double stream sixty feet high.

No. 6 is a beautiful arched spray, called by us the Grotto, with several apertures, through which, when quiet, one can easily pass, but when in action each making so many vents for the water and steam.

Upon going into camp we observed a small hot spring that had apparently built itself up about three feet. The water was warm but resting very quietly, and we camped within two hundred yards of it. While we were eating breakfast this spring, without any warning, threw, as if it were the nozzle of an enormous steam-engine, a stream of water into the air two hundred and nineteen feet, and continued doing so for some time, thereby enabling us to measure it, and then as suddenly subsided.

Surrounded by these hot springs is a beautiful cold spring of tolerably fair water. Here we found a beautiful spring or well. Raised around it was a border of pure white, carved as if by the hand of a master workman, the water pure. Looking down into it, one can see the sides white and clear as alabaster, and carved in every conceivable shape, down, down, until the eye tires in penetrating.

Standing and looking down into the steam and vapor of the crater of the Giantess, with the sun upon your back, the shadow is surrounded by a beautiful rainbow, and by getting the proper angle the rainbow, surrounding only the head, gives that halo so many painters have vainly tried to give in paintings of the Saviour. Standing near the fountain when in motion, and the sun shining, the scene is grandly magnificent; each of the broken atoms of water shining like so many brilliants, while myriads of rainbows are dancing attendance. No wonder then that our usually staid and sober companions threw up their hats and shouted with ecstacy at the sight.

We bid farewell to the geysers, little dreaming there were more beyond. Five miles below Burnt Hole we found the "Lake of Fire and Brimstone." In the valley we found a lake measuring four hundred and fifty yards in diameter, gently overflowing, that had built itself up by a deposit of white substrata, at least fifty feet above the plain. This body of water was steaming hot. Below this was a similar spring, but of smaller dimensions, while between the two, and apparently having no connection with either, was a spring of enormous volume flowing into the Madison, and is undoubtedly the spring which BRIDGER has been laughed at so much about, as heating the Madison for two miles below. For some distance down the river we found hot springs and evidences of volcanic action. Our passage down the river was a little rough but generally very pleasant, and on the evening of the 22d we reached the first ranche on the Madison, where we found a paper dated September 1st, the latest news from the inside world. Next day we sent to Virginia for papers, and soon found that the world had been moving.

Our trip was a grand success, only marred by the loss of one of our number. If he is merely lost, there is still hope of his return, as he had a good horse and plenty of ammunition and matches. The danger is, that he has been killed by the Indians for his horse and gun. H. D. W.

—*Helena, Montana, Herald.*

The Gauge for the Railways of the Future.*

By ROBERT F. FAIRLIE.

THE object of this paper is to show in what manner, and to some extent in what degree, the cost of the construction and maintenance of railways is affected by the gauge on which they are built; and by what means it would be possible at once to increase the dividends of shareholders, and to extend the countless advantages railways afford to all parts of the habitable globe, however thinly peopled or unproductive. It will be in the recollection of many that the question of the proper gauge for railways was once a matter of earnest dispute; and that what was called the "Battle of the Gauges," as between broad and narrow, was fought with desperate vigor and with no decided result. Each party of belligerents retired from the contest with heavy pecuniary loss; but neither would allow that the other had been the victor. The result was that the construction of each gauge was pushed forward by those who were interested in it; and thus it befell that a broad gauge line was carried into the northern districts, from which its subsequent removal was the best proof that it ought never to have been taken there.

Although the controversy to which I have referred was conducted with singular ability, and at a very lavish expenditure of the money of the confiding shareholders, it is curious to observe that those concerned in it seem never to have taken into account the relative economy of the plans that they respectively advocated. The consideration of this most important element in the question would have thrown upon it a totally new light. But the very word was at the time unknown to the railway world, and the thing which the word signifies has scarcely yet gained its due share of consideration. Had it done so, the present paper would have been unnecessary; for it would have been proved, years ago, that while a narrow gauge is infinitely less costly than a broader one, its capabilities in respect of power and speed are fully equal to the wants of the country. If this had been known, we should not have seen, as at present, large districts deprived of all prospects of railway accommodation; and thousands of shareholders regretting the loss of that return to which their expenditure has fairly entitled them.

Apart from the important question of economy, the carrying capacity of gauges less than 4 feet 8½ inches has never yet been considered in its true light. It has been hastily assumed that a line of narrower gauge than this would be very limited both in its carrying power, and also as regards the speed at which trains could be run; and it has been argued that the saving in cost would be too small to render it desirable to make a change. It is not my purpose to advocate such a change in Great Britain, where a 4 feet 8½ inch gauge is actually established and at work, and where it affords the necessary facilities for the speeds of 60 or 70 miles per hour that are actually run over it; but only to take the conditions of English railway traffic as an illustration of my general arguments. At the same time it must not be forgotten that these conditions could be in some degree modified in the direction of economy by the employment of a new and lighter description of rolling stock. It is known and everywhere admitted that the proportion of non-paying to paying weight in passenger trains is as much as 29 to 1, and in goods trains, exclusive of minerals, as much as 7 to 1. This terrible disproportion is partly due to the system of management pursued: but in a far greater degree to the gauge. The dead-weight of trains conveying either passengers or goods is in direct proportion to the gauge on which they run; or, in other words, the proportion of non-paying to paying weight (as far as this is independent of management) is increased exactly as the rails are farther apart, because a ton of materials disposed upon a narrow gauge is stronger as regards its carrying power than the same weight when spread out over a wider basis. In proof of this proposition I need only cite the case of the Festinog Railway, with its gauge of 1 foot 11½ inches. The wagons used upon it for carrying timber weigh only 12 cwt., and they frequently carry a load of over 3½ tons at a speed of 12 miles an hour. In other words, these wagons

*read before the British Association, at Liverpool.

carry as much as six times their own weight, whilst the best wagons on the ordinary English narrow gauge do not carry as much as twice their own weight.

The good management of the London and North-Western Railway is so universally admitted, that it will seem almost presumptuous to select this line as an illustration of the faults of the existing system. I have, however, selected it, because its management is such that its shortcomings must be wholly due to its construction; and I shall proceed to show that, if its gauge were 3 feet instead of 4 feet 8½ inches, its goods traffic could be hauled at half the present cost, with half the present motive power, and in such a way as to reduce the present tonnage over the road by one-half, and to remove the necessity for the heavy expense that is now being incurred in the construction of a third line of rails. I am perfectly prepared for the incredulity with which these statements will at first be received; but I shall prove their correctness by figures that cannot err. The writer who originally said that a train weight of 30 tons had to be set in motion for every ton of passengers carried, was at first ridiculed for his pains; but after a time, and when people came to inquire into the matter, it was found that his statement was absolutely correct, insomuch that it is now universally received and admitted. In like manner the facts about the goods traffic require only to be investigated; and every one possessed of common sense will find it easy to understand them.

The goods and mineral traffic on the London and North-Western Railway for a single year amount to about 15,000,000 tons. I will assume that five out of these of 15,000,000 tons are minerals, consisting chiefly of coal; and I will deal only with the 10,000,000 tons of goods which are left as the net residue of the year's carrying. It has been proved that the proportion of non-paying to paying weight is about 7 tons to 1 ton; and this would give 70,000,000 tons of rolling weight employed to carry the 10,000,000 tons of paying load. In order to avoid all risk of exaggeration, I will assume the dead weight to be only as 4 tons to 1; which reduces from 70,000,000 to 40,000,000 tons the weight of the wagons employed to carry the 10,000,000 tons of paying load. The whole gross weight hauled by the locomotives will then be 50,000,000 of tons, at an average speed of 25 miles an hour.

The earnings for the goods traffic on this line are 6s. 3d. per train mile; which, at an average rate all round of 1½d. per mile, would give about 50 tons as the paying weight, and 225 tons as the gross weight hauled per train mile. Dividing this 225 tons into the 50,000,000, gives 196,089 trains; which, being divided by the 313 working days of a year, give 626 merchandise trains, over all parts of the North-Western Railway, in the 24 hours.

The company's balance-sheet shows that each net ton produces about 4s. 8d. (including minerals, but as the net amount earned per train mile in the merchandise and mineral traffic may be taken as averaging nearly the same, this does not vitiate the argument), which, at 1½d. per ton per mile, makes the average distance traversed by each ton to be about 38 miles; so that as each ton of the total weight hauled runs 38 miles, and the entire length of line worked is 1432 miles, it follows that there must be on an average 37 trains distributed over the total length. This number, divided into the total number of trains per day of 24 hours, gives an average of over 17 trains per day running on each mile of the line. My object in bringing the figures to this point is to show that, although at first sight the number, 626 trains per day, looks large, yet when divided over the entire line, it is comparatively small.

Having arrived at this conclusion, we are in a position to see how it would affect the question if the gauge of the line were 3 feet instead of 4 feet 8½ inches. In the first place, the same or a greater speed could be maintained, say up to thirty-five or forty miles an hour. I mention the speed here because I am dealing with goods trains only. Of course when passenger trains is considered, the element of speed tells largely in favor of the broad (*i. e.*, 4 feet 8½ inches) gauge; but this has been already admitted. My argument is only intended to show what a 3 feet gauge is capable of accomplishing in the way of duty, up to a speed of forty miles an hour; a speed which on such a gauge can only be obtained by the employment of the double bogie engines.

The speeds in each case being therefore equal, the next point to examine is the result of carrying on the narrow gauge. The proportion of non-paying to paying load has been taken at four to one on the broad gauge, although it has proved largely in excess of this. The wagons employed average four tons in weight, so that on this reckoning each wagon carries one ton for every mile it runs. It would be well to remember here that I am dealing with things as they are, not as they might be.

The wagons for a line of 3 feet gauge weigh each 1 ton, and carry a maximum load of 3 tons. Supposing that the same number of wagons and trains were run on the narrow gauge as on the broad, it follows that the average 1 ton of merchandise now carried would easily be taken in a wagon weighing 1 ton instead of 4 tons, and that the gross load passing over the line for one year would be only 20,000,000 of tons instead of 50,000,000; whilst the same amount of paying weight would be carried in either case. That is, the small wagons, which are capable of carrying three times the weight of goods now actually carried in a 4-ton wagon, would only have to carry one-third of that quantity, and would produce the same paying load as the heavier wagons; thus, instead of 50,000,000 of tons travelling over the line, there would be only 20,000,000, and, as the haulage cost is precisely the same whether the tons hauled consist of paying or of non-paying load, it follows that this expense would be reduced to two-fifths of what it now is. We must also consider the enormous saving to the permanent way, which would have to bear the friction and weight of only 20,000,000 of tons in the place of 50,000,000. If we assume the same number of trains to run per day, the weight of each would be reduced from 255 tons to 102 tons; or, if the same gross weight of train was employed, the number of trains per day would be reduced from 626 to 250. If there should be sufficient traffic to load the narrow-gauge in such a way as to require the same number and weight of trains that are now worked, the result would be that, without increasing by one penny the cost of haulage and of the permanent way expenses, the 3 feet gauge would carry a paying load of 25,000,000 of tons as against the 10,000,000 now carried. Here, then, we have established the fact that, so far as capacity goes, the narrow gauge is superior to the broad one. The former can produce 25,000,000 net out of a gross tonnage of 50,000,000; whilst the latter, to produce the same result, if continued to be worked as it now is, would require that 125,000,000 tons should be hauled, and that an increased cost in the same proportion of 125,000,000 to 150,000,000.

It may occur to some of my hearers to ask at this stage whether locomotives can be built to haul large train loads on a 3 feet gauge at the same speeds at which such loads as are now taken on the broad gauge—my answer to this is decidedly "YES."

The Fairlie double bogie engine can not only be made to haul trains fully as heavy and at the same speeds as those now taken on the broad gauge; but it will do this on what is termed a light railway, with rails that shall not be required to exceed fifty pounds to the yard, and that shall be fairly worn out, instead of being ground and crushed out as the eighty-four pound rails are under the present system.

It will be seen from this that a very large and important saving could be effected on the London and North-Western railway, if its gauge were 3 feet instead of 4 feet 8½ inches, without changing in the least degree its present system of management; and this saving, divided between the public and the shareholders, would largely reduce the tariffs to the one whilst it as largely increased the dividends to the other.

Before entering on another example of the advantages of the narrow gauge, it will perhaps be well to explain why it is that the average paying-load now carried on the North-Western railway bears so small a proportion to the weight of the wagons employed in carrying it. The reason is obvious enough. The railway covers a very large area of country, and penetrates into districts from which there is a very unequal traffic; so that there must be a very large average of empty wagons passing from one place to another, in order to accommodate this traffic. It is impossible to find the same tonnage leaving a station that enters it. There is also great competition for the traffic—since most, if not all, of the large towns touched by this railway are also supplied by one or more lines belonging to other companies, and the inhabitants, having a choice, take care to avail themselves of it by fighting one company against the other. The result is, that each company tries to outbid its neighbor, not only in rates of charge, but also in affording the greatest despatch. This practically amounts to a competition as to which company shall run the greatest number of half-filled or empty wagons.

Suppose, for example, that a person delivers a bundle of chairs, or a quantity of any goods, at a station, to be forwarded to some other station. The station-master cannot keep the chairs or other goods until he has a wagon-load going to the same place; but he must despatch them forthwith, perhaps alone in a wagon that ought to carry ten times the quantity. But whatever may be the explanation of the small proportion of paying to non-paying load, the fact must in any case tell in favor of the narrow gauge. Suppose even that the wagons always ran empty one-half their time. Take the case of coal wagons, which run full only one way, and return empty. The narrow gauge still has the advantage, for they are only one-ton wagons that run empty, instead of being four-ton wagons. In the case of the bundle of chairs, there would only be the actual weight of the chairs added to that of the one-ton wagon, instead of to the weight of a four-ton wagon; so that, however the matter is looked at, it will always be found that the advantages, on the score of economy, are enormously in favor of light, narrow gauge railways.

In India the competition between companies does not exist, and it is possible to detain goods at stations until a maximum quantity is obtained for transport. Time is there of little importance, and hence it has been urged that under such circumstances a large gauge and large wagons are the best, in order that it may be practicable to run a small number of heavy trains per day.

It is impossible to conceive an argument more fallacious than this; and its employment has saddled India with the commencement of a system of railways extravagantly beyond the requirements of the country for the next hundred years, or even for ever.

I have just shown that a three-feet gauge line can carry without an additional shilling for haulage, two and a half times as many tons as are now carried over the 4 feet 8½ inch gauge of the North-Western railway. Whence, then, arises the necessity for constructing the Indian railways on a 5 feet 6 inch gauge?—especially when it is remembered that the total goods traffic worked over the whole of them does not amount to a sixth part of that now carried on the North-Western line alone.

Taking the case of the East Indian railway as being the North-Western of India, let us see how the absence of competition and the 5 feet 6 inch gauge affect the question of transport. The number of net tons hauled over the line for the year ending 1869, was 938,629, in 32,496 trains; amounting to about 29 tons per train. The average number of wagons composing a train is taken at 25, of 6 tons each; which gives 150 tons of train to 29 tons of freight, or a proportion of over 5 tons of dead to 1 ton of paying load. It will be seen that, notwithstanding the absence of competition, and with everything to favor the working of the line, the actual dead weight is over 5 tons to 1 ton. If, on the other hand, the gauge had been 3 feet instead of 5 feet 6 inches, the dead weight, under the same management, would have been reduced from 5 to 1, to 1¼ to 1. Let us imagine the saving that this change would effect in fuel alone; considering that less than one-fourth of the tonnage now hauled would afford precisely the same accommodation to the traffic that now exists, and would produce the same paying result. It surely does not require a philosopher to see that the narrow gauge is infinitely superior in every respect even to the 4 feet 8½ inch gauge, and it ought to be engraved on the mind of every engineer, that every inch added to the width of a gauge beyond what is absolutely necessary for the traffic, adds to the cost of construction, increases the proportion of dead weight, increases the cost of working, and, in consequence, increases the tariffs to the public, and by so much reduces the useful effect of the railway. Let us suppose, for one moment, that the conditions of the cost of construction in the two instances were reversed, and that a 3 feet gauge line would cost twice as much to make as a 5 feet 6 inch gauge; even in such a case the difference in the cost of working each ton of goods would be so enormous that the narrow gauge would be by far the cheapest of the two in the end. It is unnecessary to say that the cost of constructing a railway is nearly as the width of its gauge; in very rough countries, the narrow gauge will be greatly less than the proportion to its width, whilst on flat, level ground, the proportion will be more; but, taking the average, (excluding rolling stock, fencing, stations, and telegraphs,) the cost will be found to vary as the gauge. The advocates of the 5 feet 6 inch gauge, not content with the burden which they have imposed upon India, are striving to impose a similar burden upon our colonies, and, in too many instances, they have actually succeeded. The Colony of Victoria, for example, has been provided with a system of five feet six inches gauge railways, which are so magnificent and costly that they charge the colonial revenue with a trifling deficit of £30,000 per annum.

Tasmania, under the same management, has been saddled with a railway of five feet three inches gauge. There are other places similarly situated, but to mention them all would prolong the paper beyond its proper limits. I have shown sufficient evidence to prove what I said at the commencement; and, through the medium of this great Association, I desire to inform the inhabitants of countries in which railways are required, how these can be obtained cheaply and efficiently. In moderately temperate climates, gauges of two feet six inches will be found ample for any traffic in any part of the world, and will sustain a speed of thirty miles an hour; while three feet is sufficient for either very hot or very cold climates, and will sustain a speed of forty miles an hour.

Railways can be made cheaply, and, at the same time, to be thoroughly efficient; and those who aver to the contrary are, in fact, enemies to progress and to civilization. There is no country too poor to have railways sufficient for its requirements; and railways furnish the cheapest possible means of transport when they are not borne down by the results of that incompetence and extravagance which we so often see associated together. I regard it as the duty of every man in the old country to assist those of the new by pointing out how they may benefit by our dear-bought experience, and may avoid the pitfalls into which only too many of our railway shareholders have fallen.

The present railways in India, although doubtless valuable for military purposes, have cost about £20,000 per mile. The average rate per ton paid on the East Indian Railway, is 2¼d. per ton per mile. It may be fairly questioned how far these lines are boons to the inhabitants, who are called upon to pay taxes to cover the heavy annual interest on the cost, as well as to pay the high tariff of rates mentioned above. In any Indian extensions it should clearly be our aim to satisfy the natives, and to develop traffic at their hands. How different would the results have been, even now, if the lines had cost £5,000 instead of £20,000 per mile, and if the tariff of rates had been ¼d. per ton per mile instead of 2¼d. Not only would this have been practicable if the narrow gauge had been adopted, but the charge for the conveyance of salt, one of the first necessaries of life in the country, need not have exceeded ¼d. per ton per mile.

I cannot close this paper without some reference to a matter that is now part of history, and that serves as an admirable illustration of the manner in which self interest, or even mere conservatism, may render men blind to the most obvious propositions. There are some whose whole desire it seems to be to rest in the paths that they have become accustomed to tread; and whose instincts lead them at once to turn and rend any one who proposes a change. In January last my presence was hurriedly required in St. Petersburg by the Russian Minister of Public Works, with reference to the subject of the Fairlie system of railways, to which attention had been called by the very able articles upon the "Railway Problem," which appeared in the *Times* on the 19th, 20th, and 21st of October, 1869. His Excellency the Minister required me to give a short distinct account of the advantages claimed for my system. I replied, that by the adoption of that system railways could be made at a cost of little over one-half the sum required to construct them on the ordinary plan; so that it would be possible to give nearly two miles for the sum now expended on one. That these lines, when finished and equipped, would possess a carrying capacity equal to, if not greater than, that of those on the old system. In other words, they should be capable of carrying as many passengers and tons of goods in twenty-four hours as the best lines now existing; and that this should be done at a reduced cost, independent of the reduced wear and tear of the permanent way, and of the value of the increased life of the rails.

His Excellency observed, that if only a portion of this could be accomplished it would be a great thing for Russia, and that the matter should be at once inquired into. Not many days elapsed before an Imperial Commission, composed of a number of the most noted scientific men in Russia, and presided over by his Excellency, the Count Alexis Robrinsky, private Attache to his Imperial Majesty the Emperor, was instructed to come to this country and to investigate the correctness of what I had asserted. Early in February the Commission arrived in London, and after a thorough examination of the question in all its theoretical bearings, it was resolved to put it to some practical tests. The Council of India, the Board of Trade, Norway, France, and other countries sent their representative men to be present on the occasion, as it was felt that what was good for Russia would be equally good for the countries I have mentioned. His Grace the Duke of Sutherland, always anxious to promote any system that will most largely benefit mankind, and having already a large section of railways of his own, built expressly to improve the condition of his tenantry, joined the party and took a most active interest in all the proceedings. The results of the experiments then made are pretty well known, and any who may not be acquainted with them will find printed records of them on the table.

The Commission returned to Russia, and sent in its report to the effect that I had fully proved the correctness of all my assertions. This was in March ; and in April a railway of fifty versts, on the new system, was ordered by His Majesty the Emperor to be constructed, and to be opened in November next. The locomotives for this railway may be seen any day during the next month at the establishment of Messrs. SHARP, STEWART & Co., Manchester. The new system has also been adopted for working some of the old lines, and the stock for the Tamhoff Saratoff Railway, the great Russian, and others, may be seen under construction at the same establishment.

The Members of the Council of India were so struck with the accounts of the system, that the Home Engineers of the several Indian Railways were requested to report to their respective Boards their opinions on the applicability of a new narrow gauge for India. I have seen several of these reports, the whole of which are unanimous in the bitterness of their opposition to any improvement, or to any interference with the old expensive system under which the writers have lived, and moved, and had their being ; but in only one of them is there any argument that requires a moment's notice. Mr. HAWKSHAW, in his report to the directors of the Eastern Bengal Railway, urges that since those who are in favor of a narrow gauge argue upon the basis of a light rolling stock, the same basis should also be taken by the advocates of a broad gauge. Were it not for this attempt at reasoning, and also for the fact that Mr. BIDDER very fiercely attacks both me and my system, I should have left the reports wholly without mention. But I think it is worth while to reply to Mr. HAWKSHAW, and also to place on record that Mr. BIDDER has evidently never seen my system, although often invited to do so ; and that he has based his condemnation of it upon an incorrect description, both as regards principles and details.

The claim to calculate for broad gauge lines on the basis of a lighter rolling stock is practically an admission that grave errors have been made in designing that which is now in use. and which it is proposed theoretically to set aside while the question of gauge is under discussion. But, however Mr. HAWKSHAW may build his stock in the future, he cannot possibly build it so light and capable of doing so much duty for the broad as for the narrow gauge. His argument is a complete confession of the mistakes made under the old *regime;* whilst at the same time it is an attempt to extinguish the general wish to inquire into the merits of the new. It is asking to be forgiven for the past, with a promise to do better in the future, or to do anything rather than permit clients to go to a new school.

It is a sad incident in the great history of human error when we thus find able men led into such blunders as these by their anxiety to resist innovation. How different would be the course of invention, how smooth the path of improvement, what years of anxious labor would be saved to many of us, if such men would lay aside all petty rivalries, and would bring their helping hands to the good work of progress.

MINING SUMMARY.

Colorado.

The *Rocky Mountain News* gives the following particulars concerning the recent exhibition of Colorado ores at the recent Territorial Fair at Denver: "The mineral display was unsurpassed, while the bullion display never had an equal in Colorado. There was one solid piece of gold bullion, value $39,061 65 ; one silver button weighing 1,141 pounds, value $20,000 ; one weighing 400 pounds, $7,000 ; one 93½ pounds, value $1,027 ; and one 113 pounds, $1,635. The two first were from the Brown Company, Georgetown, and the third from the Terrible mine, and the last from 42 tons of Snowdrift ore. Nothing could have exceeded the richness of the mineral department. No finer display of ores was ever seen in the West, or in the world."

The following account of the specimens from Clear Creek County was prepared by Mr. BARNARD, of the *Colorado Miner*, Georgetown: "Griffith District.—Silver ores ; all coin, per ton of 2,000 pounds. Sweepstakes lode, assay $440 coin ; Peruvian lode, mill run, $513 80 ; Gilpin lode, mill run, $120 ; Ni-Wot lode, assay, $400 ; Griffith lode, assay, $120 ; Guthrie lode, mill run, $723 coin ; New Boston lode, assay, $30 coin. Fifty per cent. lead.—Terrible lode, mill run, $650 coin ; Lake Superior lode, assay, $146 coin ; Magnet lode, mill run, $320 coin : Mammoth lode, assay, $500 coin ; Brown lode, mill run, $650 coin ; Quaker lode, mill run, $200 coin ; Franklin lode, mill run, $96 coin ; Astor lode, assay, $400 coin ; Mendota lode, assay, $260 coin ; Robert Emmet lode, mill run, $179 10 coin ; Bunker Hill, assay, $800 coin ; E Pluribus Unum lode, assay, $1,000 coin ; General Jackson lode, assay, $200 ; Cashier lode, mill run, $230 coin ; Federal lode, select specimens, assay, $27,000 coin ; second class, assay, $800 ; O. K. lode, mill run, $1,176 coin ; Dives lode, assay, $646 coin ; Silver Plume lode, 500 pounds, assay, $2,535 64 coin ; Snowdrift lode, one lot, 300 pounds, assay, $3,356 60 ; one lot, 100 pounds, assay, $3,159 ; one lot, 100 pounds, Galena, assay, $1,404 coin ; Congress lode, assay, $100. Argentine District.—Stevens lode, mill run, $206 coin, sixty-five per cent. lead ; Paymaster lode, assay, $84 50, eighty per cent. lead ; Baker lode, mill run, $120 coin. Upper Union District, gold.—Silver Mountain lode, mill run, $100 coin ; Conqueror, $125 coin. Daney District, silver.—Mountain Ram lode, assay, $444 coin. Montana District.—Commonwealth lode, assay, $40 coin, fifty per cent. lead ; Congress lode, assay, $240 coin ; Highland lode, assay, $200 coin ; Capital lode, assay, $240 coin. Morris District.—Massachusetts lode value not known. Lincoln District, argentiferous and auriferous ore. Blazing Star lode, surface, assay gold, $8 26 coin ; silver, $158 34 coin, sixty-five feet in depth, gold, $74 82 ; silver, $633 33 coin, thirteen per cent. copper. Idaho District.—Seaton lode, silver mass, 455 pounds, mill run, $300 coin ; Schafter lode, native gold, value unknown."

GOV. M'COOK'S ADDRESS.

From the interesting address of Gov. M'COOK, of Colorado, at the Denver Fair, we make the following extracts :

"IRRIGATION.

"* * * I think it has been demonstrated both by scientific research and practical experiment that in any region (like this of Colorado) of stratified rocks, artesian wells can be successfully sunk wherever the surface is lower, as is that of this country, than the mountains around. Here, wherever a well is sunk on the plain, there is a strong probability of striking water that has its source at a higher level. This experiment has never yet been thoroughly tried here, but certainly the most bigoted unbelievers in the country west of the Missouri will admit that the plains east of the Rocky Mountains are not more arid than the desert of Sahara, and there water has almost invariably been reached at the depth of twelve hundred feet. What I have said about artesian wells is said simply because it is one of the troubled questions, one of the undetermined experiments exciting the interest of a portion of the territory. There will be no real necessity for artesian irrigation until a much larger portion of our 67,723,520 acres of land is occupied than will probably be occupied during the next twenty years—for we have now more than six millions of acres of unoccupied land that can be irrigated by ordinary means, that is, by the natural streams of the country. Now, although for years large crops have been raised in England, Scotland, France, and some of our Southern States, by a system of irrigation, and although some years ago the first prize of the New York State Agricultural Society was given to a farm cultivated exclusively by irrigation, yet I do not believe the same satisfactory results have ever been attained, or the same remarkable yield secured in any other country as in Colorado. In 1869 Mr. MAGNES, whose farm is on the South Platte, seven miles above Denver, raised ninety bushels of wheat on one acre of land, sixty-five and one-half bushels on another acre, and five hundred and fifty bushels of wheat on ten acres of another farm. THOMAS G. ANDERSON raised ninety bushels of oats on another acre ; and WM. HUNING, on the Purgatoire, twelve miles below Trinidad, raised six hundred and forty bushels of oats on eight acres. Near the same place, Mr. RANKIN raised two hundred and fifty bushels of onions on half an acre. Here, to-day, within these grounds, I have seen on exhibition ninety-three measured bushels of wheat which were raised on one acre ; 232 bushels of 'English Excelsior' on four acres, and 166 bushels of 'Black Swedish' on two acres. Potatoes, 1,000 bushels on three acres, or 333⅓ bushels to the acre ; 54 of these potatoes made a measured bushel and weighed 59½ pounds. Onions planted in a hot-bed, and raised out doors afterwards, yielding 1,000 bushels to the acre ; sugar beets forty tons to the measured acre ; from one pound of seed barley 110 pounds were produced, and in fact everything invested in this wonderfully prolific country, cereal, vegetable, animal, mineral, or human, appears to yield an annual increase of about one hundred per cent. * * * By carefully comparing the total number of acres cultivated with the quantity produced I find the following to be about the average yield throughout the territory : Wheat, 38 bushels per acre ; oats, 55 bushels per acre ; corn, 30 bushels per acre : potatoes, 150 to 200 bushels per acre ; onions, 250 bushels per acre ; beans, 30 bushels per acre. * * *

"MINES.

"We have demonstrated our title to the consideration of the world by exporting sixty millions of dollars of gold and silver, and showing that we possess internal resources of all kinds equal to those of any country on the globe ; resources that have brought here a stream of emigration which is but the precursor of the flood that is to come. There is nothing in Europe that answers to the vast deposits of metals and minerals here ; nothing like the agricultural and pastoral resources of our plains ; and this war in Europe, so full of misfortune, poverty and death to them, will be to us as a future help, for here are new homes and fruitful fields for the men, who, while winning glory for their country, have lost homes and fortunes and occupation for themselves. I have never heard any man doubt the fact that the area of the mines of Colorado was greater, and the average value of their ores richer, than any others on the American continent. Heretofore our extreme isolation, crude manner of mining, combined with the high prices of labor and provisions, has prevented the mines from yielding to their owners the rich profits which a different system of working would have probably given ; the greater part of mining has been experimental merely ; and to a certain extent unassisted by scientific knowledge or practical skill. While mines in California yielding but nine, ten or fifteen dollars per ton, and in some instances only six, have given immense fortunes to their proprietors, in Colorado mines which yield forty, fifty, sixty, and I am informed even ninety dollars per ton, have been permitted to remain idle, because their ambitious owners were not willing to devote time and labor to working such poor ore. I believe that wherever gold and silver has been found in mass and position, people have thought worth while to pick it up ; though last year I saw mines worked, and paying an ounce per day to the man, which had been abandoned years ago by gentlemen who wished to 'make their pile' more rapidly than eighteen or twenty dollars per day would enable them to. I do not think the history of the whole world will furnish another instance of a country so rich in precious metals whose mines have been so carelessly, and I may say recklessly worked, and so entirely neglected, as those of Colorado ; but notwithstanding this, they have produced over two hundred dollars gold and silver per year for every man, woman and child in the territory ; or about sixteen hundred and eighty dollars per year to each man engaged in mining or any other legitimate occupation in the mining districts. Now, this may not appear to you a very large aggregate individual income, but if you compare it with the result of labor in other parts of the Union, you will find it to be from three to five hundred per cent. greater in Colorado than in any other part of this country, or of the world. I wish you also to bear in mind that much of the gold exported from this territory went through private channels, has never been included in our Territorial Statistics, and was not used as part of the basis upon which my statements have been founded. I think the era of our mining prosperity has but just begun ; the mines in other portions of the United States are becoming exhausted, while here new discoveries are made each day, and old mines have not yet commenced to be developed. Science is progressing with the rest of the world, and will eventually give us results which must make our ores invaluable."

NOTES ON ITS MINES AND MILLS.

From the Georgetown *Miner* we learn that the total product of the Brown mine, up to date, is $166,554 55 coin value. The greatest depth from the surface obtained on the mine is 200 feet. There are two levels in the mine, 110 feet apart, one 500 and the other 250 feet in length, making a total of 750 feet of stoping ground. The mine is producing large quantities of good ore at the present time. The total product of the Terrible mine, up to date, is $270,000 coin value. In the west portion of the mine 298 fathoms have been stoped out. and in the east portion of the mine 130 fathoms have been stoped out. The total net profits of the Federal mine, up to date, are $8,151. The total amount of work done on this mine is four months' work for one man. The production of bullion by the new mill of the Stewart Reducing Company, for the month of September, will amount to $10,000. So we are informed by J. O. STEWART, Esq. Under the superintendency of A. BECHTEL, Esq., who has had charge of the affairs of the Baker Silver Mining Company during the past eleven months, the bullion product of the Baker mine has been $27,556 97 coin value.

The Central City *Herald*, Oct. 5, has these items of news : "Ore is somewhat scarce at present at the mills, but the supply has increased in quantity lately. The North Star mill, owned by KIMBER, BUFFINGTON & GARRET, is one of the best in Black Hawk, and is always well supplied with custom ores. Its twenty-five stamps run night and day, and their results can always be relied on. LAKE'S CONANT & FULLERTON'S, and MEAD'S two mills on North Clear Creek are working without intermission and satisfactorily. Mr. HANNINGTON, agent of the Consolidated Gregory, is drifting successfully in that company's mine, which keeps twenty-five stamps of their mill steadily at work. MATT HAYS is working a portion of the stamps at the New York mill, and the old Woodbury and Norton mill has been running, except at intervals when stopped for repairs. MILLER & BORUM have been running their 20-stamp mill regularly all summer. They are now crushing Fiske, Milwaukee and other custom ore. The Smith & Parmelee mill is employed on ore from the Fiske and other lodes of the Company. The Sensenderfer mill (Mr. Rogers') is crushing ore from the Sensenderfer mine. Nevada's supply of quartz holds out well, and fully as much will be mined the coming winter as last. Nevada at this time is the liveliest town in Gilpin county. Several buildings and dwelling-houses are going up about town. SANDS & HATTENBACH'S brick store is nearly completed. WHITCOMB'S addition to his mill is up and its ten new stamps will be running within two weeks. Five claims are worked on the California, the quartz from which is generally yielding fair returns. Some of these, however, expect to be obliged to commence sinking soon. On the Gardner (a continuation) of the California, six claims are being worked. A large quantity of the ore is obtained from these lodes. SCUDDER is employing a large force at the Roderic Dhu lode, who are getting out a very considerable amount of ore, which is crushed at the Lexington (22-stramp) mill. This is one of the best-running and saving mills in the county. Four different parties are working claims on the Kansas lode. B. C. WATERMAN, A. S. BENNETT, SULLIVAN WHEELER & JESTER, and a party of Cornishmen, who have leased a claim of JOHN SCHELLIGER. WATERMAN is running fifty-two stamps, double issue, thirty-two in the Kansas-Colorado mill, and twenty in that of Eureka Gulch, both of which work to a charm. They are supplied with ore from his claims on the Kansas, Camp Grove and Flack leads, which are paying well. WATERMAN'S claims on the Gardner supply ore for the Philadelphia 25-stamp mill. POTTER & HOLLEY run their own and the New Bedford on custom ore. Clayton and Hardisty are each running without cessation, the latter on Burroughs. LEWIS, at the Gilpin county mill, is supplied with ore from the same lode. The Whitcomb mill is also running day and night. Mr. BEACH is working the Illinois mill, and is getting out considerable ore. Altogether there are more stamps in motion in Nevada than at any time within our recollection—twelve mills with 208 stamps (including the Eureka and Lexington.) The Prize lode continues to yield a large quantity of very rich quartz. Both the Central and Commonwealth companies' claims are paying well. The Sudeberg, near by, is extensively worked. JOHN YOUNG is mining on several claims of this lode. WOODWARD & BOSTWICK are sinking on their claim with good prospects, and LEYDEN & Co., ditto., with commendable energy and perseverance. Very good accounts are given of the latter claim. The Jones lead is generally paying well. Four claims are worked on it. That of Capt. PHILLIPS has lately been yielding rich pay. The Kent county, Mercer county, Forks, Indiana, Rising Sun, Mount Desert, and other lodes on Quartz hill are being mined, in many instances with success. J. HOGAN'S Gould and Curry mine has been paying a handsome profit this summer. BALSINGER & KINGSBURY have leased HARDISTY'S claim on the Burroughs, from which they are getting some very fine-looking quartz. The shaft is 100 feet down, and has a wide crevice. Selected ore from this claim has lately yielded over twenty ounces to the cord, and when not sorted from eight to ten ounces. We understand that rich pay has been struck in the Sudyburg lode. Although we rejoice in the success of all our mines, and while we know that the parties working this mine are deserving of success, we are at the same time sorry to learn that a long and vexatious lawsuit will be likely to ensue, between the Commonwealth Company, of Boston, and the Central Company. The latter has been one of the truly unfortunate investments in our country. Rows of houses, and we might add churches, have been built by money taken from the mines of that company. The investment was made in good faith, and we would be sorry to see the title disturbed ; but of course we know nothing about the merits of the case, and are unable to give an opinion on its merits. The company is closely connected with the Grass Valley Company, both here and at New York, and if that company should now stop operations, which is likely to occur during the pending of this important trial, more than 100 men would be thrown out of employment, and at least ten or twelve thousand dollars per month taken from our monthly shipment of bullion. The loss would be felt here at the beginning of our long winter."

Montana.

COMPLETION OF AN IMPORTANT DITCH.

The Helena *Gazette*, Sept. 26, says: "We learn from Capt. STAFFORD, of Cañon Ferry, that water was let in on Thursday from Avalanche to Cave Gulch ditch, and two hundred inches are now

running on the rich foot-hills of that vicinity, to which we have often referred. The water crosses Avalanche cañon through 1,500 feet of sheet-iron pipe, where it is laid around a point of rocks. The pipe has a downward inclination of 108 feet, and forces the water up again seventy feet on the other side. Everything works to a charm; the miners are at work on the rich foot-hills, and livelier times than have blessed Cave Gulch for some time are expected. Next spring employment will be offered to many hands, and should the other ditches also contain a fair share of water, that part of Meagher county will experience a great revival of the mining interests. Capt. STAFFORD and his associates in this work deserve credit for their energy and enterprise, and we hope their pecuniary remuneration will be most ample."

THE WASHINGTON GULCH.

A correspondent of the Helena *Herald*, writing from Washington, September 17, says: "A storm has been raging for the past few days, and consequently work has been suspended. But it was of no loss, in the end, to the boys. They now have a nice increase of water, and will probably have a sufficient supply to carry them through the season. PARKINSON & JAMES are busy at work on reservoirs, and by the commencement of another season, this enterprising firm will be able to supply the camp with water, so that work may go on uninterruptedly thoughout the entire season. HARRIS BROTHERS and BONER are also improving some valuable reservoir property, which will be another additional advantage to the water supply of the camp. Hope, that most essential and cardinal quality, for success in mining enterprises, abounds largely in the breasts of the miners here, and all predict that the brightest day of our little camp is yet to come. New discoveries are made as each succeeding year takes its place in the calendar of Time. I weighed a prospect a few days since from newly-discovered ground, which will pay from nine to fourteen cents to the square foot of bed-rock. The ground is shallow, nowhere exceeding nine feet in depth, and most admirably situated for hydraulicing. The ground has a heavy grade, and the bank is free from clay and cement. HARRIS Brothers have sold their aqueduct, pressure boxes, etc., known as the Upper Hardscrabble Co., to DAN SEVERNS. Terms—private. HARRIS Brothers have also sold their interest in the hydraulic claim, known as the S. C. Mining Co., to the other partners — BONER, HOAGLIN & HIGBEE. The figures are kept secret, though it is surmised that a goodly sum was paid, as the ground is among the best in camp yet developed. HARRIS Brothers intend to devote their time and energies to the improvement of the reservoir property before alluded to, and to the development of mining ground, of which I will speak in some future epistle. As these men are miners of some sixteen to twenty years' experience, we may look for some good developments in the placer line before long. SLOAN, DAVIDSON & Co. are doing exceedingly well in Last Chance. STILES, BINGHAM & Co. are running two hydraulics, and their ground is paying from $9 to $15 to the hand. KROGER & CHENVOY are also taking out good money, considering that their supply of water is limited. PARKER & WRIGHT'S is paying from twelve to fifteen cents to the square foot of bed-rock. This company has also a scanty supply of water, and I learn that they contemplate bringing in a ditch from Meadow Creek, which will afford them an abundance of the needful. The saw-mill of Judge PINCKNEY, which has been undergoing a thorough repair, this summer, has been running for a short time, and is turning out some nice lumber. A shingle machine is also to be attached to the above mill, so that the days of dirt-roofs are nigh unto death."

NELSON GULCH ITEMS.

"Imperial" writes to the *Herald* from Nelson Gulch and gives the following items: "The miners are generally doing well in this gulch, and all taking out the precious metal in good-paying quantities. CHARLES SPENCER & Co. averaging $8 per day to the man. One of the members of the Company recently sold his interst to GEORGE W. REED for $500. JAMES PIERCE & Co. are doing tolerably well, and TAYLOR & Co. are taking out from $9 to $10 per day to the man; D. G. FLETCHER & Co. from $5 to $7 per day to the man. TOM RISLEY and CHARLES FRY have just commenced working their claims. The Jarl Flume Company recently picked up, a few feet from the surface, a nugget weighing two ounces seven pennyweights and a half. It is believed their ground will pay $30 per day to the man. This company expect to make the biggest clean-up that has been made in this gulch for five years. JOHN GOW, RICHARD & Co., and the Elkhorn Company are making good wages. All the miners in this gulch have large expectations for next season, when the Park Lake ditch is completed and abundance of water will be furnished. Times will be lively around here next year."

THE PARK LAKE DITCH.

Under charge of Messrs. JOHNSON & BUSKET, contractors, the work on the Park Lake ditch is, according to the *Herald*, "being rapidly pushed forward. Upwards of eighty men are constantly employed, and the ditch-digging and flume-building are progressing with uninterrupted regularity. The contract calls for the completion of the ditch to the head of Grizzly by November 1st, and at or before that time the great work will be finished to that point. There will be lively and highly-remunerative mining in and around Helena, commencing with the opening of spring, 1871."

Arizona.

NEW DISCOVERIES OF EXTRAORDINARY RICH GOLD MINES—THE "DEL PASCO" MINE.

The Prescott *Miner*, Sept. 10, has the following account:—Immediately on the return of MCCRACKIN & Co. from Bradshaw Mountain, two weeks since, with $1,900, which they had taken out of the Del Pasco lode, as stated in the *Miner* of August 20, quite a number of our citizens started for that locality. Ten of them returned Tuesday last with reports of the country and new discoveries, which created considerable excitement in Prescott, and caused sundry and divers persons to get out of town, with their little traps, before sundown, bound for the Bradshaw Mountain. F. G. CHRISTIE, one of our oldest pioneers, was one of those who came in on Tuesday, and furnished us with the following items: "The section in which these lately-discovered mines or lodes are located is a belt of talcose slate, about one-half mile in average width, running north-east and south-west across Bradshaw Mountain. The formation outside the slate belt is similar to that of the Sierra Prietra range, viz., poryphyritic granite, and contains many quartz veins of favorable appearance, to which no attention is given at present. The slate belt is full of rich quartz veins running parallel with each other and the belt, very much decomposed. These veins vary from one inch to three feet on the surface, and only the largest have as yet been sunk upon to any depth. Mr. CHRISTIE is of the opinion that the Black Canyon placer mines which have been worked with good results almost constantly since 1863, receive their gold from this slate belt. The Del Pasco Company have reached a depth of twenty-five feet on that vein, and find the vein gradually widening all the way down, and no diminution of the richness of the ore, and, as yet, no sulphurets; the quartz was getting more solid and required blasting; their powder having given out, the Company had commenced work on another vein a few yards below the Del Pasco, and were getting out decomposed rock of surprising richness; $38 had been washed out of one pan of the rotten vein matter, and from $10 to $20 the pan had been frequently obtained. The Company were in the highest spirits, and value their claims at fabulous prices. They were grinding the rock in arastras, and expect to realize much better results than on their first run. Mr. CHRISTIE, in company with Messrs. POLAND, FARRINGTON and POSTLE, discovered and located several promising leads, and they, in company with DAN HATZ and five others—ten in all—located on a vein, in a sort of basin, about a mile and a half from the Del Pasco, about three and one-half feet in width, which prospects very regularly in fine gold, and gives excellent surface indications of permanence. They think they have struck a big thing, and call it the "New Era." Six or seven of the ten start back to-day with a good outfit of tools and provisions to commence work on their locations. A passable wagon road already exists to the old Bully Bueno mill on Turkey Creek, and Mr. HATZ says that, with the exception of one hill, which would require considerable work, a road could easily be made to the foot of the mountain from the mill. By the road to the mill and the new mines the distance is about fifty-five miles. By trail over the mountains, the way the travel now goes, the distance from Prescott is called forty miles. The mines are in the midst of a heavy growth of pine timber, and water is plenty. The New Era Company think they have a stream large enough to run arastras by water power. If these mines hold out, as they have begun, Bradshaw will eclipse our older quartz mining districts completely."

THE OLD MINES.

The same paper has the following account of operations in the old mines: "On Tuesday last, Messrs. C. C. BEAN, G. W. BOWERS, H. B. SUMMERS, I. S. FRIED and H. A. BIGELOW left Prescott, well mounted and armed for the mines. We made a short stop at DAVIS & TAYLOR'S cabin, at the head of the Hassayampa. About a mile and a half from the divide we came to the Eureka mill—now the property of Mr. BEAN. The clatter of the ten stamps, which sounded in our ears long before the mill was visible, gave token of mining activity which was realized as we approached the mill. Mr. ATCHISON, well known in Nevada and other mining regions as Uncle JOHN, is superintending operations at the Eureka for Mr. BEAN, who has employed in and around the mill twenty-eight men, cutting wood, mining, hauling wood and ore, etc. The next day we went on foot to the mines in the immediate vicinity of the mill, visiting the Box Elder, Vernon, Tie-Tie, Pine Mountain and Pointer. Mr. BEAN has men at work getting ore from the Tie-Tie, the Eureka—or a vein which crosses or runs into that lode—and from an extension of the Pointer; and the ore from each looks well and prospects well also. As the intention is enly to work the ores for free gold, the veins are being worked only from the surface to a depth of fifteen or eighteen feet, as at that point all the Lynx creek ores change to sulphurets. The Tie-Tie at the depth of fifteen feet is four feet wide, the ore much decomposed, and of fine quality. The Pointer is about three feet wide where Mr. BEAN is opening it, and the ore looks as well as any we ever saw from the shafts on the original location. Considerable trouble has been experienced in getting the mill into good running order, but Uncle JOHN thinks he has all right, and will make a run of two weeks on the ores mentioned, as an experiment, which we hope will be a paying one. No other mines on Lynx creek are now being worked than those Mr. BEAN is prospecting, except the Vernon—where we found CHRIS. SHELTON in the end of an 80-foot tunnel, pecking away alone. He has a rich vein of decomposed quartz—which averages not more than six inches wide, and has paid about $275 per ton. The vein, though narrow, is opened at intervals on the surface for five hundred feet. The deepest point which the tunnel will reach on the vein is sixty feet. SHELTON has some four tons of ore out, which is rich enough to show to anybody, and he is the only miner we saw who don't care to go to the Bradshaw. On our way home by the wagon road down Lynx creek, and two miles from the Eureka, we stopped for a few minutes at the old Thunderbolt mill. Messrs. WARD & SWEARINGEN took hold of this mill a few weeks ago, and have fixed it up in good shape. They are nearly ready to commence work crushing ore for any parties who will furnish it at reasonable prices. Their energy deserves a success which we hope they may meet with. The opinion has often been expressed by men of some experience that the Lynx creek mines do not afford sufficient free gold to pay, and if the Eureka mill does not, in the hands of Mr. ATCHISON, prove the falsity of the assertion, the *Miner* will throw up the sponge."

The *Miner* has the following additional notes: "WM. MCCLOUD called on us last Wednesday. He came up alone from People's Valley, and states that on Little Copper creek, Tuesday night, Indians hallooed at him from the hills. He says FRED. HENRY & Co. are in eighty feet with the tunnel which they are running to the Rainbow lode. In the tunnel they have cut a vein which is ten inches thick and very rich. They expect to reach the Rainbow in ten or fifteen feet further. MCCLOUD brought us a piece of rock from the little vein, which is very good. The Rainbow is situated about four miles from People's old ranch, and FRED. believes it contains his home stake. One of the Prescott merchants last week purchased of ANDY ANDERSON 200 feet on the Vernon—that rich quartz vein on Lynx creek, discovered and worked by C. Y. SHELTON. The figures are not made public. ANDY has made a raise on Lynx creek by mining, and leaves this morning for San Francisco and other places, where he can get more fun for his money than in Prescott. Uncle BILLY POINTER closed mining operations on his mine on Lynx creek last week for the season—water having failed so that he can no longer run his wheel. He states that on the last run he ground twenty-six tons of rock, from which he realized $1,200 in free gold."

Canada.

SILVER MINES ON LAKE SUPERIOR.

Although it has long been known that rich silver deposits existed in numerous localities on Lake Superior, there has heretofore been no systematic attempt at mining the argentiferous material. "Recently, however, says the Detroit *Post*, a mine has been opened with favorable prospects, and under auspices which promise the most satisfactory results that skill, energy, and the employment of ample means can evolve. The mine in question is located on Silver Islet, a small island in the vicinity of Fort William, on the north shore. The vein is what is known as quartz-bearing, and runs under the surface of the water. On Thursday last the schooner H. A. Richmond was chartered for the purpose of taking thither 300 tons of clay, which is doubtless to be used in constructing a coffer-dam as a means of obtaining access to the ore. The mining will be prosecuted under the immediate direction of two of the principal stockholders, ALEXANDER H. SIBLEY, Esq., and Capt. WILLIAM B. DREW, the latter gentleman being well known from his connection with the South Pewabic Mining Company. Several Detroit capitalists are interested in the enterprise, some of them to a pretty large amount. The company purpose shipping down a large quantity of ore this fall, but we are not advised as to what course will be pursued after its arrival here. The mine was discovered some time ago, but the property was then owned by parties in Montreal, whose title has been extinguished."

California.

ANNUAL STATEMENT OF THE NORTH STAR MINING COMPANY.

At the annual meeting of this company in San Francisco the trustees elected A. K. P. HARMON as President, W. C. RALSTON as Treasurer, D. JENNINGS as Secretary, and DUDLEY HOYT as Superintendent. From the annual report we condense the following items of receipts and disbursements:

RECEIPTS.

Bullion	$151,598 58
Premium on same	621 90
Sulphurets	4,165 31
Quota on contract work	6,486 54
Skimmings	11,045 50
Mill toll	2,258 00
Total receipts	$176,175 83
Liabilities	4,067 25
Total	$180,243 08

Of the liabilities $3,140 is due to the Superintendent. The disbursements were as annexed:

Mine supplies	$14,751 02
Mill supplies	25,853 02
Mining labor	66,197 67
Milling labor	17,749 37
Dead work	10,387 17
Contingent work	3,468 85
Sulphurets	2,241 81
Assaying and freight	674 08
Salaries, etc	5,295 25
Mine improvements	2,777 56
Mill improvements	4,963 11
Dividends to stockholders	6,000 00
Liquidated debts	14,780 98
Other items	3,713 86
Cash on hand	1,389 33
Total	$180,243 08

The amount of ore produced was 7,834 tons, yielding $167,431, or $21 per ton. The total cost of working the same was $131,082, or $16 73 per ton, leaving a profit of $36,350, or $4 64 per ten. Of this profit, $6,000 has been paid to stockholders, $14,7[illegible]1 on account of obligations incurred in the previous year, $10,387 for dead work, and $7,741 for improvements. The liabilities at the close were $4,067, against which there was cash to the amount of $1,389. The value of the supplies at the mine and mill on 6th September was $18,295.

Nevada.

BALD MOUNTAIN.

The Elko *Independent*, Sept. 17th, says:—Dr. BAILEY reports new and rich discoveries. He brought choice samples of copper-silver glance from the Blue Bell ledge. The Bailey mine shows well in sulphuret and chloride ore, and the Hartford in antimonial ores. Among the older locations attracting attention is the Mountain King.

MONO.

A correspondent of the Inyo *Independent*, Sept. 12th, says:—The great Dunderberg mine at Castle Peak will soon astonish the country. The vein is said to be giving out vast quantities of rich decomposed ore, and there appears to be an inexhaustible supply in sight. Dagne's mill is being pushed to completion with energy.

AURORA.

Another correspondent writes:—At Pine Grove the Wheeler Co.'s prospects are said to be good. WILSON has at last struck an abundant supply of water for his mill, and has rich ore in sight. The Kean mine at Rockland has been opened for nearly a thousand feet, and every foot shows good ore. KEAN'S mill will soon commence crushing. The mines of Silver Peak hold their reputation for richness. Columbus is rapidly becoming a centre of attraction. WETHERILL'S camp in the White Mountains is very rich, the ore assaying $300 to $5,000 per ton. Four or five tons at Reno averaged $500 per ton. The Wide West mill is in full blast. At Bodie, WALKER, LOCKBURG & Co. cleaned up 130 tons rock in an arastrar, which paid $33 per ton.

RAILROAD DISTRICT.

The Elko *Independent*, Sept. 14th, says:—Firestone from Pancake is coming for the Bullion City furnace. The Grant Company burn coal. Colonel BUEL arrived from the East yesterday, and will take hold of the mines here in earnest.

The *Silver State*, Sept. 16th, says:—The Original and South Arizona mines are taking out seventy tons per day. A large portion is shipped to San Francisco, and yields $200 to $400 to the ton. The mills are all running, and the mines never looked better. We hear of activity in outside districts, especially Alpha, Oreana Central and Battle Mountain. The Harris mine, eight miles east of Oreana, was sold on Monday to ENEAS SMITH, agent of the old Rochester Mining Company of Batavia, N. Y. We learn that some of the Hard Cash ore tested at Reno went over $800 the ton.

A Lost Vein of Silver.—The operations on the mine at Bathgate, Scotland, are now being prosecuted in earnest, and every day gives brighter hopes of success. A large, powerful steam engine has been constructed at the mines, and is constantly employed in drawing the water and rubbish from the bottom of the old workings, and all the pits are being lined with strong wood, to prevent accidents. Fourteen men are now constantly employed in these mines. The vein, which was lost in the time of King James VI., is supposed to have been found. It is quite thin at the roof of the pit, and expands as it reaches the bottom to nearly three feet. It is mixed with quartz, and has a grayish appearance, and is what is termed the steel ore. Several other rich veins of lead have been discovered. Three "lairds' land meet" close upon the spot where the ancient pit is situated, and, strange to say, these lands converge and terminate in a well similar to the one described in Burns's "Hallow-e'en." A good deal of the washing of the minerals in former days took place at this well.

BUSINESS AND PERSONAL.

[*Short notices in this column fifty cents per line each insertion.*]

GLYNN'S ANTI-INCRUSTATOR FOR STEAM BOILERS.—THE only and reliable article for removing and preventing incrustation. No foaming, and does not attack metals of boiler. Liberal terms to agents. C. D. FREDRICKS, 587 Broadway, N. Y.
April 19 tf

His Excellency observed, that if only a portion of this could be accomplished it would be a great thing for Russia, and that the matter should be at once inquired into. Not many days elapsed before an Imperial Commission, composed of a number of the most noted scientific men in Russia, and presided over by his Excellency, the Count Alexis Robrinsky, private Attache to his Imperial Majesty the Emperor, was instructed to come to this country and to investigate the correctness of what I had asserted. Early in February the Commission arrived in London, and after a thorough examination of the question in all its theoretical bearings, it was resolved to put it to some practical tests. The Council of India, the Board of Trade, Norway, France, and other countries sent their representative men to be present on the occasion, as it was felt that what was good for Russia would be equally good for the countries I have mentioned. His Grace the Duke of Sutherland, always anxious to promote any system that will most largely benefit mankind, and having already a large section of railways of his own, built expressly to improve the condition of his tenantry, joined the party and took a most active interest in all the proceedings. The results of the experiments then made are pretty well known, and any who may not be acquainted with them will find printed records of them on the table.

The Commission returned to Russia, and sent in its report to the effect that I had fully proved the correctness of all my assertions. This was in March; and in April a railway of fifty versts, on the new system, was ordered by His Majesty the Emperor to be constructed, and to be opened in November next. The locomotives for this railway may be seen any day during the next month at the establishment of Messrs. SHARP, STEWART & Co., Manchester. The new system has also been adopted for working some of the old lines, and the stock for the Tamhoff Saratoff Railway, the great Russian, and others, may be seen under construction at the same establishment.

The Members of the Council of India were so struck with the accounts of the system, that the Home Engineers of the several Indian Railways were requested to report to their respective Boards their opinions on the applicability of a new narrow gauge for India. I have seen several of these reports, the whole of which are unanimous in the bitterness of their opposition to any improvement, or to any interference with the old expensive system under which the writers have lived, and moved, and had their being; but in only one of them is there any argument that requires a moment's notice. Mr. HAWKSHAW, in his report to the directors of the Eastern Bengal Railway, urges that since those who are in favor of a narrow gauge argue upon the basis of a light rolling stock, the same basis should also be taken by the advocates of a broad gauge. Were it not for this attempt at reasoning, and also for the fact that Mr. BIDDER very fiercely attacks both me and my system, I should have left the reports wholly without mention. But I think it is worth while to reply to Mr. HAWKSHAW, and also to place on record that Mr. BIDDER has evidently never seen my system, although often invited to do so; and that he has based his condemnation of it upon an incorrect description, both as regards principles and details.

The claim to calculate for broad gauge lines on the basis of a lighter rolling stock is practically an admission that grave errors have been made in designing that which is now in use. and which it is proposed theoretically to set aside while the question of gauge is under discussion. But, however Mr. HAWKSHAW may build his stock in the future, he cannot possibly build it so light and capable of doing so much duty for the broad as for the narrow gauge. His argument is a complete confession of the mistakes made under the old *regime;* whilst at the same time it is an attempt to extinguish the general wish to inquire into the merits of the new. It is asking to be forgiven for the past, with a promise to do better in the future, or to do anything rather than permit clients to go to a new school.

It is a sad incident in the great history of human error when we thus find able men led into such blunders as these by their anxiety to resist innovation. How different would be the course of invention, how smooth the path of improvement, what years of anxious labor would be saved to many of us, if such men would lay aside all petty rivalries, and would bring their helping hands to the good work of progress.

MINING SUMMARY.

Colorado.

The *Rocky Mountain News* gives the following particulars concerning the recent exhibition of Colorado ores at the recent Territorial Fair at Denver: "The mineral display was unsurpassed, while the bullion display never had an equal in Colorado. There was one solid piece of gold bullion, value $39,061 65; one silver button weighing 1,141 pounds, value $20,000; one weighing 400 pounds, $7,000; one 93¾ pounds, value $1,027; and one 113 pounds, $1,635. The two first were from the Brown Company, Georgetown, and the third from the Terrible mine, and the last from 42 tons of Snowdrift ore. Nothing could have exceeded the richness of the mineral department. No finer display of ores was ever seen in the West, or in the world."

The following account of the specimens from Clear Creek County was prepared by Mr. BARNARD, of the *Colorado Miner*, Georgetown: "Griffith District.—Silver ores; all coin, per ton of 2,000 pounds. Sweepstakes lode, assay $440 coin; Peruvian lode, mill run, $513 80; Gilpin lode, mill run, $120; Ni-Wot lode, assay, $400; Griffith lode, assay, $120; Guthrie lode, mill run, $723 coin; New Boston lode, assay, $30 coin. Fifty per cent. lead.—Terrible lode, mill run, $650 coin; Lake Superior lode, assay, $146 coin; Magnet lode, mill run, $320 coin: Mammoth lode, assay, $500 coin; Brown lode, mill run, $650 coin; Quaker lode, mill run, $200 coin; Franklin lode, mill run, $96 coin; Astor lode, assay, $400 coin; Mendota lode, assay, $260 coin; Robert Emmet lode, mill run, $179 10 coin; Bunker Hill, assay, $800 coin; E Pluribus Unum lode, assay, $1,000 coin; General Jackson lode, assay, $200; Cashier lode, mill run, $230 coin; Federal lode, select specimens, assay, $27,000 coin; second class, assay, $800; O. K. lode, mill run, $1,176 coin; Dives lode, assay, $646 coin; Silver Plume lode, 500 pounds, assay, $2,535 64 coin; Snowdrift lode, one lot, 300 pounds, assay, $3,356 60; one lot, 100 pounds, assay, $3,159; one lot, 100 pounds, Galena, assay, $1,404 coin; Congress lode, assay, $100. Argentine District.—Stevens lode, mill run, $206 coin, sixty-five per cent. lead; Paymaster lode, assay, $84 50, eighty per cent. lead; Baker lode, mill run, $120 coin. Upper Union District, gold.—Silver Mountain lode, mill run, $100 coin; Conqueror, $125 coin. Daney District, silver.—Mountain Ram lode, assay, $444 coin. Montana District.—Commonwealth lode, assay, $40 coin, fifty per cent. lead; Congress lode, assay, $240 coin; Highland lode, assay, $200 coin; Capital lode, assay, $240 coin. Morris District.—Massachusetts lode value not known. Lincoln District, argentiferous and auriferous ore. Blazing Star lode, surface, assay gold, $8 26 coin; silver, $158 34 coin, sixty-five feet in depth, gold, $74 82; silver, $633 33 coin, thirteen per cent. copper. Idaho District.—Seaton lode, silver mass, 455 pounds, mill run, $300 coin; Schafter lode, native gold, value unknown."

GOV. M'COOK'S ADDRESS.

From the interesting address of Gov. M'COOK, of Colorado, at the Denver Fair, we make the following extracts:

"IRRIGATION.

"* * * I think it has been demonstrated both by scientific research and practical experiment that in any region (like this of Colorado) of stratified rocks, artesian wells can be successfully sunk wherever the surface is lower, as is that of this country, than the mountains around. Here, wherever a well is sunk on the plain, there is a strong probability of striking water that has its source at a higher level. This experiment has never yet been thoroughly tried here, but certainly the most bigoted unbelievers in the country west of the Missouri will admit that the plains east of the Rocky Mountains are not more arid than the desert of Sahara, and there water has almost invariably been reached at the depth of twelve hundred feet. What I have said about artesian wells is said simply because it is one of the troubled questions, one of the undetermined experiments exciting the interest of a portion of the territory. There will be no real necessity for artesian irrigation until a much larger portion of our 67,723,520 acres of land is occupied than will probably be occupied during the next twenty years—for we have now more than six millions of acres of unoccupied land that can be irrigated by ordinary means, that is, by the natural streams of the country. Now, although for years large crops have been raised in England, Scotland, France, and some of our Southern States, by a system of irrigation, and although some years ago the first prize of the New York State Agricultural Society was given to a farm cultivated exclusively by irrigation, yet I do not believe the same satisfactory results have ever been attained, or the same remarkable yield secured in any other country as in Colorado. In 1869 Mr. MAGNES, whose farm is on the South Platte, seven miles above Denver, raised ninety bushels of wheat on one acre of land, sixty-five and one-half bushels on another acre, and five hundred and fifty bushels of wheat on ten acres of another farm. THOMAS G. ANDERSON raised ninety bushels of oats on another acre; and WM. HUNING, on the Purgatoire, twelve miles below Trinidad, raised six hundred and forty bushels of oats on eight acres. Near the same place, Mr. RANKIN raised two hundred and fifty bushels of onions on half an acre. Here, to-day, within these grounds, I have seen on exhibition ninety-three measured bushels of wheat which were raised on one acre; 232 bushels of 'English Excelsior' on four acres, and 166 bushels of 'Black Swedish' on two acres. Potatoes, 1,000 bushels on three acres, or 333⅓ bushels to the acre; 54 of these potatoes made a measured bushel and weighed 59½ pounds. Onions planted in a hot-bed, and raised out doors afterwards, yielding 1,000 bushels to the acre; sugar beets forty tons to the measured acre; from one pound of seed barley 110 pounds were produced, and in fact everything invested in this wonderfully prolific country, cereal, vegetable, animal, mineral, or human, appears to yield an annual increase of about one hundred per cent. * * * By carefully comparing the total number of acres cultivated with the quantity produced I find the following to be about the average yield throughout the territory: Wheat, 38 bushels per acre; oats, 55 bushels per acre; corn, 30 bushels per acre: potatoes, 150 to 200 bushels per acre; onions, 250 bushels per acre; beans, 30 bushels per acre. * * *

"MINES.

"We have demonstrated our title to the consideration of the world by exporting sixty millions of dollars of gold and silver, and showing that we possess internal resources of all kinds equal to those of any country on the globe; resources that have brought here a stream of emigration which is but the precursor of the flood that is to come. There is nothing in Europe that answers to the vast deposits of metals and minerals here; nothing like the agricultural and pastoral resources of our plains; and this war in Europe, so full of misfortune, poverty and death to them, will be to us as a future help, for here are new homes and fruitful fields for the men, who, while winning glory for their country, have lost homes and fortunes and occupation for themselves. I have never heard any man doubt the fact that the area of the mines of Colorado was greater, and the average value of their ores richer, than any others on the American continent. Heretofore our extreme isolation, crude manner of mining, combined with the high prices of labor and provisions, has prevented the mines from yielding to their owners the rich profits which a different system of working would have probably given; the greater part of mining has been experimental merely; and to a certain extent unassisted by scientific knowledge or practical skill. While mines in California yielding but nine, ten or fifteen dollars per ton, and in some instances only six, have given immense fortunes to their proprietors, in Colorado mines which yield forty, fifty, sixty, and I am informed even ninety dollars per ton, have been permitted to remain idle, because their ambitious owners were not willing to devote time and labor to working such poor ore. I believe that wherever gold and silver has been found in mass and position, people have thought worth while to pick it up; though last year I saw mines worked, and paying an ounce per day to the man, which had been abandoned years ago by gentlemen who wished to 'make their pile' more rapidly than eighteen or twenty dollars per day would enable them to. I do not think the history of the whole world will furnish another instance of a country so rich in precious metals whose mines have been so carelessly, and I may say recklessly worked, and so entirely neglected, as those of Colorado; but notwithstanding this, they have produced over two hundred dollars gold and silver per year for every man, woman and child in the territory; or about sixteen hundred and eighty dollars per year to each man engaged in mining or any other legitimate occupation in the mining districts. Now, this may not appear to you a very large aggregate individual income, but if you compare it with the result of labor in other parts of the Union, you will find it to be from three to five hundred per cent. greater in Colorado than in any other part of this country, or of the world. I wish you also to bear in mind that much of the gold exported from this territory went through private channels, has never been included in our Territorial Statistics, and was not used as part of the basis upon which my statements have been founded. I think the era of our mining prosperity has but just begun; the mines in other portions of the United States are becoming exhausted, while here new discoveries are made each day, and old mines have not yet commenced to be developed. Science is progressing with the rest of the world, and will eventually give us results which must make our ores invaluable."

NOTES ON ITS MINES AND MILLS.

From the Georgetown *Miner* we learn that the total product of the Brown mine, up to date, is $166,554 55 coin value. The greatest depth from the surface obtained on the mine is 200 feet. There are two levels in the mine, 110 feet apart, one 500 and the other 250 feet in length, making a total of 750 feet of stoping ground. The mine is producing large quantities of good ore at the present time. The total product of the Terrible mine, up to date, is $270,000 coin value. In the west portion of the mine 298 fathoms have been stoped out, and in the east portion of the mine 130 fathoms have been stoped out. The total net profits of the Federal mine, up to date, are $8,151. The total amount of work done on this mine is four months' work for one man. The production of bullion by the new mill of the Stewart Reducing Company, for the month of September, will amount to $10,000. So we are informed by J. O. STEWART, Esq. Under the superintendency of A. BECHTEL, Esq., who has had charge of the affairs of the Baker Silver Mining Company during the past eleven months, the bullion product of the Baker mine has been $27,556 97 coin value.

The Central City *Herald*, Oct. 5, has these items of news: "Ore is somewhat scarce at present at the mills, but the supply has increased in quantity lately. The North Star mill, owned by KIMBER, BUFFINGTON & GARRET, is one of the best in Black Hawk, and is always well supplied with custom ores. Its twenty-five stamps run night and day, and their results can always be relied on. LAKE'S CONANT & FULLERTON'S, and MEAD'S two mills on North Clear Creek are working without intermission and satisfactorily. Mr. HANNINGTON, agent of the Consolidated Gregory, is drifting successfully in that company's mine, which keeps twenty-five stamps of their mill steadily at work. MATT HAYS is working a portion of the stamps at the New York mill, and the old Woodbury and Norton mill has been running, except at intervals when stopped for repairs. MILLER & BORUM have been running their 20-stamp mill regularly all summer. They are now crushing Fiske, Milwaukee and other custom ore. The Smith & Parmelee mill is employed on ore from the Fiske and other lodes of the Company. The Sensenderfer mill (Mr. Rogers') is crushing ore from the Sensenderfer mine. Nevada's supply of quartz holds out well, and fully as much will be mined the coming winter as last. Nevada at this time is the liveliest town in Gilpin county. Several buildings and dwelling-houses are going up about town. SANDS & HATTENBACH'S brick store is nearly completed. WHITCOMB'S addition to his mill is up and its ten new stamps will be running within two weeks. Five claims are worked on the California, the quartz from which is generally yielding fair returns. Some of these, however, expect to be obliged to commence sinking soon. On the Gardner (a continuation) of the California, six claims are being worked. A large quantity of the ore is obtained from these lodes. SCUDDER is employing a large force at the Roderic Dhu lode, who are getting out a very considerable amount of ore, which is crushed at the Lexington (22-stramp) mill. This is one of the best-running and saving mills in the county. Four different parties are working claims on the Kansas lode. B. C. WATERMAN, A. S. BENNETT, SULLIVAN WHEELER & JESTER, and a party of Cornishmen, who have leased a claim of JOHN SCHELLIGER. WATERMAN is running fifty-two stamps, double issue, thirty-two in the Kansas-Colorado mill, and twenty in that of Eureka Gulch, both of which work to a charm. They are supplied with ore from his claims on the Kansas, Camp Grove and Flack leads, which are paying well. WATERMAN'S claims on the Gardner supply ore for the Philadelphia 25-stamp mill. POTTER & HOLLEY run their own and the New Bedford on custom ore. Clayton and Hardisty are each running without cessation, the latter on Burroughs. LEWIS, at the Gilpin county mill, is supplied with ore from the same lode. The Whitcomb mill is also running day and night. Mr. BEACH is working the Illinois mill, and is getting out considerable ore. Altogether there are more stamps in motion in Nevada than at any time within our recollection—twelve mills with 208 stamps (including the Eureka and Lexington.) The Prize lode continues to yield a large quantity of very rich quartz. Both the Central and Commonwealth companies' claims are paying well. The Sudeberg, near by, is extensively worked. JOHN YOUNG is mining on several claims of this lode. WOODWARD & BOSTWICK are sinking on their claim with good prospects, and LEYDEN & Co., ditto., with commendable energy and perseverance. Very good accounts are given of the latter claim. The Jones lead is generally paying well. Four claims are worked on it. That of Capt. PHILLIPS has lately been yielding rich pay. The Kent county, Mercer county, Forks, Indiana, Rising Sun, Mount Desert, and other lodes on Quartz hill are being mined, in many instances with success. J. HOGAN'S Gould and Curry mine has been paying a handsome profit this summer. BALSINGER & KINGSBURY have leased HARDISTY'S claim on the Burroughs, from which they are getting some very fine-looking quartz. The shaft is 100 feet down, and has a wide crevice. Selected ore from this claim has lately yielded over twenty ounces to the cord, and when not sorted from eight to ten ounces. We understand that rich pay has been struck in the Sudyburg lode. Although we rejoice in the success of all our mines, and while we know that the parties working this mine are deserving of success, we are at the same time sorry to learn that a long and vexatious lawsuit will be likely to ensue, between the Commonwealth Company, of Boston, and the Central Company. The latter has been one of the truly unfortunate investments in our country. Rows of houses, and we might add churches, have been built by money taken from the mines of that company. The investment was made in good faith, and we would be sorry to see the title disturbed; but of course we know nothing about the merits of the case, and are unable to give an opinion on its merits. The company is closely connected with the Grass Valley Company, both here and at New York, and if that company should now stop operations, which is likely to occur during the pending of this important trial, more than 100 men would be thrown out of employment, and at least ten or twelve thousand dollars per month taken from our monthly shipment of bullion. The loss would be felt here at the beginning of our long winter."

Montana.

COMPLETION OF AN IMPORTANT DITCH.

The Helena *Gazette*, Sept. 26, says: "We learn from Capt. STAFFORD, of Cañon Ferry, that water was let in on Thursday from Avalanche to Cave Gulch ditch, and two hundred inches are now

running on the rich foot-hills of that vicinity, to which we have often referred. The water crosses Avalanche cañon through 1,500 feet of sheet-iron pipe, where it is laid around a point of rocks. The pipe has a downward inclination of 108 feet, and forces the water up again seventy feet on the other side. Everything works to a charm; the miners are at work on the rich foot-hills, and livelier times than have blessed Cave Gulch for some time are expected. Next spring employment will be offered to many hands, and should the other ditches also contain a fair share of water, that part of Meagher county will experience a great revival of the mining interests. Capt. STAFFORD and his associates in this work deserve credit for their energy and enterprise, and we hope their pecuniary remuneration will be most ample."

THE WASHINGTON GULCH.

A correspondent of the Helena *Herald*, writing from Washington, September 17, says: "A storm has been raging for the past few days, and consequently work has been suspended. But it was of no loss, in the end, to the boys. They now have a nice increase of water, and will probably have a sufficient supply to carry them through the season. PARKINSON & JAMES are busy at work on reservoirs, and by the commencement of another season, this enterprising firm will be able to supply the camp with water, so that work may go on uninterruptedly thoughout the entire season. HARRIS BROTHERS and BONER are also improving some valuable reservoir property, which will be another additional advantage to the water supply of the camp. Hope, that most essential and cardinal quality, for success in mining enterprises, abounds largely in the breasts of the miners here, and all predict that the brightest day of our little camp is yet to come. New discoveries are made as each succeeding year takes its place in the calendar of Time. I weighed a prospect a few days since from newly-discovered ground, which will pay from nine to fourteen cents to the square foot of bed-rock. The ground is shallow, nowhere exceeding nine feet in depth, and most admirably situated for hydraulicing. The ground has a heavy grade, and the bank is free from clay and cement. HARRIS Brothers have sold their aqueduct, pressure boxes, etc., known as the Upper Hardscrabble Co., to DAN SEVERNS. Terms—private. HARRIS Brothers have also sold their interest in the hydraulic claim, known as the S. C. Mining Co., to the other partners — BONER, HOAGLIN & HIGBEE. The figures are kept secret, though it is surmised that a goodly sum was paid, as the ground is among the best in camp yet developed. HARRIS Brothers intend to devote their time and energies to the improvement of the reservoir property before alluded to, and to the development of mining ground, of which I will speak in some future epistle. As these men are miners of some sixteen to twenty years' experience, we may look for some good developments in the placer line before long. SLOAN, DAVIDSON & Co. are doing exceedingly well in Last Chance. STILES, BINGHAM & Co. are running two hydraulics, and their ground is paying from $9 to $15 to the hand. KROGER & CHENVOY are also taking out good money, considering that their supply of water is limited. PARKER & WRIGHT'S is paying from twelve to fifteen cents to the square foot of bed-rock. This company has also a scanty supply of water, and I learn that they contemplate bringing in a ditch from Meadow Creek, which will afford them an abundance of the needful. The saw-mill of Judge PINCKNEY, which has been undergoing a thorough repair, this summer, has been running for a short time, and is turning out some nice lumber. A shingle machine is also to be attached to the above mill, so that the days of dirt-roofs are nigh unto death."

NELSON GULCH ITEMS.

"Imperial" writes to the *Herald* from Nelson Gulch and gives the following items: "The miners are generally doing well in this gulch, and all taking out the precious metal in good-paying quantities. CHARLES SPENCER & Co. averaging $8 per day to the man. One of the members of the Company recently sold his interst to GEORGE W. REED for $500. JAMES PIERCE & Co. are doing tolerably well, and TAYLOR & Co. are taking out from $9 to $10 per day to the man; D. G. FLETCHER & Co. from $5 to $7 per day to the man. TOM RISLEY and CHARLES FRY have just commenced working their claims. The Jarl Flume Company recently picked up, a few feet from the surface, a nugget weighing two ounces seven pennyweights and a half. It is believed their ground will pay $30 per day to the man. This company expect to make the biggest clean-up that has been made in this gulch for five years. JOHN GOW, RICHARD & Co., and the Elkhorn Company are making good wages. All the miners in this gulch have large expectations for next season, when the Park Lake ditch is completed and abundance of water will be furnished. Times will be lively around here next year."

THE PARK LAKE DITCH.

Under charge of Messrs. JOHNSON & BUSKET, contractors, the work on the Park Lake ditch is, according to the *Herald*, "being rapidly pushed forward. Upwards of eighty men are constantly employed, and the ditch-digging and flume-building are progressing with uninterrupted regularity. The contract calls for the completion of the ditch to the head of Grizzly by November 1st, and at or before that time the great work will be finished to that point. There will be lively and highly-remunerative mining in and around Helena, commencing with the opening of spring, 1871."

Arizona.

NEW DISCOVERIES OF EXTRAORDINARY RICH GOLD MINES—THE "DEL PASCO" MINE.

The Prescott *Miner*, Sept. 10, has the following account:—Immediately on the return of MCCRACKIN & Co. from Bradshaw Mountain, two weeks since, with $1,900, which they had taken out of the Del Pasco lode, as stated in the *Miner* of August 20, quite a number of our citizens started for that locality. Ten of them returned Tuesday last with reports of the country and new discoveries, which created considerable excitement in Prescott, and caused sundry and divers persons to get out of town, with their little traps, before sundown, bound for the Bradshaw Mountain. F. G. CHRISTIE, one of our oldest pioneers, was one of those who came in on Tuesday, and furnished us with the following items: "The section in which these lately-discovered mines or lodes are located is a belt of talcose slate, about one-half mile in average width, running north-east and south-west across Bradshaw Mountain. The formation outside the slate belt is similar to that of the Sierra Prietra range, viz., poryphyritic granite, and contains many quartz veins of favorable appearance, to which no attention is given at present. The slate belt is full of rich quartz veins running parallel with each other and the belt, very much decomposed. These veins vary from one inch to three feet on the surface, and only the largest have as yet been sunk upon to any depth. Mr. CHRISTIE is of the opinion that the Black Canyon placer mines which have been worked with good results almost constantly since 1863, receive their gold from this slate belt. The Del Pasco Company have reached a depth of twenty-five feet on that vein, and find the vein gradually widening all the way down, and no diminution of the richness of the ore, and, as yet, no sulphurets; the quartz was getting more solid and required blasting; their powder having given out, the Company had commenced work on another vein a few yards below the Del Pasco, and were getting out decomposed rock of surprising richness; $38 had been washed out of one pan of the rotten vein matter, and from $10 to $20 the pan had been frequently obtained. The Company were in the highest spirits, and value their claims at fabulous prices. They were grinding the rock in arastras, and expect to realize much better results than on their first run. Mr. CHRISTIE, in company with Messrs. POLAND, FARRINGTON and POSTLE, discovered and located several promising leads, and they, in company with DAN HATZ and five others—ten in all—located on a vein, in a sort of basin, about a mile and a half from the Del Pasco, about three and one-half feet in width, which prospects very regularly in fine gold, and gives excellent surface indications of permanence. They think they have struck a big thing, and call it the "New Era." Six or seven of the ten start back to-day with a good outfit of tools and provisions to commence work on their locations. A passable wagon road already exists to the old Bully Bueno mill on Turkey Creek, and Mr. HATZ says that, with the exception of one hill, which would require considerable work, a road could easily be made to the foot of the mountain from the mill. By the road to the mill and the new mines the distance is about fifty-five miles. By trail over the mountains, the way the travel now goes, the distance from Prescott is called forty miles. The mines are in the midst of a heavy growth of pine timber, and water is plenty. The New Era Company think they have a stream large enough to run arastras by water power. If these mines hold out, as they have begun, Bradshaw will eclipse our older quartz mining districts completely."

THE OLD MINES.

The same paper has the following account of operations in the old mines: "On Tuesday last, Messrs. C. C. BEAN, G. W. BOWERS, H. B. SUMMERS, I. S. FRIED and H. A. BIGELOW left Prescott, well mounted and armed for the mines. We made a short stop at DAVIS & TAYLOR'S cabin, at the head of the Hassayampa. About a mile and a half from the divide we came to the Eureka mill—now the property of Mr. BEAN. The clatter of the ten stamps, which sounded in our ears long before the mill was visible, gave token of mining activity which was realized as we approached the mill. Mr. ATCHISON, well known in Nevada and other mining regions as Uncle JOHN, is superintending operations at the Eureka for Mr. BEAN, who has employed in and around the mill twenty-eight men, cutting wood, mining, hauling wood and ore, etc. The next day we went on foot to the mines in the immediate vicinity of the mill, visiting the Box Elder, Vernon, Tie-Tie, Pine Mountain and Pointer. Mr. BEAN has men at work getting ore from the Tie-Tie, the Eureka—or a vein which crosses or runs into that lode—and from an extension of the Pointer; and the ore from each looks well and prospects well also. As the intention is only to work the ores for free gold, the veins are being worked only from the surface to a depth of fifteen or eighteen feet, as at that point all the Lynx creek ores change to sulphurets. The Tie-Tie at the depth of fifteen feet is four feet wide, the ore much decomposed, and of fine quality. The Pointer is about three feet wide where Mr. BEAN is opening it, and the ore looks as well as any we ever saw from the shafts on the original location. Considerable trouble has been experienced in getting the mill into good running order, but Uncle JOHN thinks he has all right, and will make a run of two weeks on the ores mentioned, as an experiment, which we hope will be a paying one. No other mines on Lynx creek are now being worked than those Mr. BEAN is prospecting, except the Vernon—where we found CHRIS. SHELTON in the end of an 80-foot tunnel, pecking away alone. He has a rich vein of decomposed quartz—which averages not more than six inches wide, and has paid about $275 per ton. The vein, though narrow, is opened at intervals on the surface for five hundred feet. The deepest point which the tunnel will reach on the vein is sixty feet. SHELTON has some four tons of ore out, which is rich enough to show to anybody, and he is the only miner we saw who don't care to go to the Bradshaw. On our way home by the wagon road down Lynx creek, and two miles from the Eureka, we stopped for a few minutes at the old Thunderbolt mill. Messrs. WARD & SWEARINGEN took hold of this mill a few weeks ago, and have fixed it up in good shape. They are nearly ready to commence work crushing ore for any parties who will furnish it at reasonable prices. Their energy deserves a success which we hope they may meet with. The opinion has often been expressed by men of some experience that the Lynx creek mines do not afford sufficient free gold to pay, and if the Eureka mill does not, in the hands of Mr. ATCHISON, prove the falsity of the assertion, the *Miner* will throw up the sponge."

The *Miner* has the following additional notes: "WM. MCCLOUD called on us last Wednesday. He came up alone from People's Valley, and states that on Little Copper creek, Tuesday night, Indians hallooed at him from the hills. He says FRED. HENRY & Co. are in eighty feet with the tunnel which they are running to the Rainbow lode. In the tunnel they have cut a vein which is ten inches thick and very rich. They expect to reach the Rainbow in ten or fifteen feet further. MCCLOUD brought us a piece of rock from the little vein, which is very good. The Rainbow is situated about four miles from People's old ranch, and FRED. believes it contains his home stake. One of the Prescott merchants last week purchased of ANDY ANDERSON 200 feet on the Vernon—that rich quartz vein on Lynx creek, discovered and worked by C. Y. SHELTON. The figures are not made public. ANDY has made a raise on Lynx creek by mining, and leaves this morning for San Francisco and other places, where he can get more fun for his money than in Prescott. Uncle BILLY POINTER closed mining operations on his mine on Lynx creek last week for the season—water having failed so that he can no longer run his wheel. He states that on the last run he ground twenty-six tons of rock, from which he realized $1,200 in free gold."

Canada.

SILVER MINES ON LAKE SUPERIOR.

Although it has long been known that rich silver deposits existed in numerous localities on Lake Superior, there has heretofore been no systematic attempt at mining the argentiferous material. "Recently, however, says the Detroit *Post*, a mine has been opened with favorable prospects, and under auspices which promise the most satisfactory results that skill, energy, and the employment of ample means can evolve. The mine in question is located on Silver Islet, a small island in the vicinity of Fort William, on the north shore. The vein is what is known as quartz-bearing, and runs under the surface of the water. On Thursday last the schooner H. A. Richmond was chartered for the purpose of taking thither 300 tons of clay, which is doubtless to be used in constructing a coffer-dam as a means of obtaining access to the ore. The mining will be prosecuted under the immediate direction of two of the principal stockholders, ALEXANDER H. SIBLEY, Esq., and Capt. WILLIAM B. DREW, the latter gentleman being well known from his connection with the South Pewabic Mining Company. Several Detroit capitalists are interested in the enterprise, some of them to a pretty large amount. The company purpose shipping down a large quantity of ore this fall, but we are not advised as to what course will be pursued after its arrival here. The mine was discovered some time ago, but the property was then owned by parties in Montreal, whose title has been extinguished."

California.

ANNUAL STATEMENT OF THE NORTH STAR MINING COMPANY.

At the annual meeting of this company in San Francisco the trustees elected A. K. P. HARMON as President, W. C. RALSTON as Treasurer, D. JENNINGS as Secretary, and DUDLEY HOYT as Superintendent. From the annual report we condense the following items of receipts and disbursements:

RECEIPTS.

Bullion	$151,598 58
Premium on same	621 90
Sulphurets	4,165 31
Quota on contract work	6,486 54
Skimmings	11,045 50
Mill toll	2,258 00
Total receipts	$176,175 83
Liabilities	4,067 25
Total	$180,243 08

Of the liabilities $3,140 is due to the Superintendent. The disbursements were as annexed:

Mine supplies	$14,751 02
Mill supplies	25,853 02
Mining labor	66,197 67
Milling labor	17,749 37
Dead work	10,387 17
Contingent work	3,468 85
Sulphurets	2,241 81
Assaying and freight	674 08
Salaries, etc	5,295 25
Mine improvements	2,777 56
Mill improvements	4,963 11
Dividends to stockholders	6,000 00
Liquidated debts	14,780 98
Other items	3,713 86
Cash on hand	1,389 33
Total	$180,243 08

The amount of ore produced was 7,834 tons, yielding $167,431, or $21 per ton. The total cost of working the same was $131,082, or $16 73 per ton, leaving a profit of $36,350, or $4 64 per ten. Of this profit, $6,000 has been paid to stockholders, $14,7[illegible]1 on account of obligations incurred in the previous year, $10,387 for dead work, and $7,741 for improvements. The liabilities at the close were $4,067, against which there was cash to the amount of $1,339. The value of the supplies at the mine and mill on 6th September was $18,295.

Nevada.

BALD MOUNTAIN.

The Elko *Independent*, Sept. 17th, says:—Dr. BAILEY reports new and rich discoveries. He brought choice samples of copper-silver glance from the Blue Bell ledge. The Bailey mine shows well in sulphuret and chloride ore, and the Hartford in antimonial ores. Among the older locations attracting attention is the Mountain King.

MONO.

A correspondent of the Inyo *Independent*, Sept. 12th, says:—The great Dunderberg mine at Castle Peak will soon astonish the country. The vein is said to be giving out vast quantities of rich decomposed ore, and there appears to be an inexhaustible supply in sight. Dagne's mill is being pushed to completion with energy.

AURORA.

Another correspondent writes:—At Pine Grove the Wheeler Co.'s prospects are said to be good. WILSON has at last struck an abundant supply of water for his mill, and has rich ore in sight. The Kean mine at Rockland has been opened for nearly a thousand feet, and every foot shows good ore. KEAN'S mill will soon commence crushing. The mines of Silver Peak hold their reputation for richness. Columbus is rapidly becoming a centre of attraction. WETHERILL'S camp in the White Mountains is very rich, the ore assaying $300 to $5,000 per ton. Four or five tons at Reno averaged $500 per ton. The Wide West mill is in full blast. At Bodie, WALKER, LOCKBURG & Co. cleaned up 130 tons rock in an arastrar, which paid $33 per ton.

RAILROAD DISTRICT.

The Elko *Independent*, Sept. 14th, says:—Firestone from Pancake is coming for the Bullion City furnace. The Grant Company burn coal. Colonel BUEL arrived from the East yesterday, and will take hold of the mines here in earnest.

The *Silver State*, Sept. 16th, says:—The Original and South Arizona mines are taking out seventy tons per day. A large portion is shipped to San Francisco, and yields $200 to $400 to the ton. The mills are all running, and the mines never looked better. We hear of activity in outside districts, especially Alpha, Oreana Central and Battle Mountain. The Harris mine, eight miles east of Oreana, was sold on Monday to ENEAS SMITH, agent of the old Rochester Mining Company of Batavia, N. Y. We learn that some of the Hard Cash ore tested at Reno went over $800 the ton.

A Lost Vein of Silver.—The operations on the mine at Bathgate, Scotland, are now being prosecuted in earnest, and every day gives brighter hopes of success. A large, powerful steam engine has been constructed at the mines, and is constantly employed in drawing the water and rubbish from the bottom of the old workings, and all the pits are being lined with strong wood, to prevent accidents. Fourteen men are now constantly employed in these mines. The vein, which was lost in the time of King James VI., is supposed to have been found. It is quite thin at the roof of the pit, and expands as it reaches the bottom to nearly three feet. It is mixed with quartz, and has a grayish appearance, and is what is termed the steel ore. Several other rich veins of lead have been discovered. Three "lairds' land meet" close upon the spot where the ancient pit is situated, and, strange to say, these lands converge and terminate in a well similar to the one described in Burns's "Hallow-e'en." A good deal of the washing of the minerals in former days took place at this well.

BUSINESS AND PERSONAL.

[*Short notices in this column fifty cents per line each insertion.*]

GLYNN'S ANTI-INCRUSTATOR FOR STEAM BOILERS.—THE only and reliable article for removing and preventing incrustation. No foaming, and does not attack metals of boiler. Liberal terms to agents. C. D. FREDRICKS, 587 Broadway, N. Y.
April 19 tf

MARKET REVIEW.

The Coal Trade.

NEW YORK, Oct. 14, 1870.

WHOLESALE.—Trade remains very dull for this season of the year, The mild weather of the past few days has had the tendency to take the "pluck" out of every one. The steady mining and supply of coal from all the regions except Schuylkill, has caused a weakness in prices, and this may also be the reason for dull trade. Everybody seems satisfied that there is plenty of coal to be had, and puts off laying in stocks. We are afraid that some of our customers will be "caught napping" at the first spirt of cold weather, and suddenly find that it is difficult to get a supply when everybody wants coal. It seems to us that a cautious business man would partially supply his wants now, and would not hesitate, at the present low prices, to at least lay in half of his winter supply; besides, coal purchased before winter sets in is in a much better condition for consumption. Another consideration, it seems to us, should urge dealers to lay in their coal—the advance in freights, that always takes place from ice-bound rivers and bays, and when navigation is thus made difficult, there is always great delay in filling orders, and we have often heard of dealers being without coal, but having plenty of customers. If prices were high, we would not thus urge dealers to their duty, but as prices are now, there is not the slightest chance or risk to run, as we believe it impossible for any of the first-class coals to recede in prices.

RETAIL.—There is a good business doing; prices range from $6 50 to $7 50, according to quality.

FREIGHTS.—There is no particular change in freights. The latest quotations will be found duly recorded in our columns.

The Delaware and Hudson Canal Company, after suspending navigation for some two weeks, were able to resume it again, for a few days, just after our last great rain. A despatch was received at their office to-day, saying that in the course of one or two days they would have coal at Rondout for delivery, navigation having now been renewed. We quote coal at Rondout at—Chestnut, $4 50; Stove, $5 50; Egg and Grate, $4 90 @ $5.

ITEMS.

HANNETT & WELLS circular says that the recent freshet on the Potomac river will seriously interfere with the transportation of the Cumberland coal to Georgetown, and, as a natural consequence, prices at that port have rapidly risen.

The market has been dull and steady, the shippers having maintained prices by not forcing sales, and showing no great anxiety to dispose of their coal in advance at less than present rates.

The change in tolls on the Philadelphia and Reading Railroad does not seem to have materially affected quotations, Egg and Stove not having sustained the advance, while the decline in the larger sizes has been nearly equal to the change in drawbacks on coal shipped from Port Richmond.

It would be useless for us to attempt to foretell the condition of the trade for the next two months but we believe it will chiefly depend (if no interruption in the production occurs) upon the weather, as signs of any early winter would, no doubt, greatly stimulate the demand.

The *Public Record* says the miners in the Schuylkill region are much dissatisfied with the sliding scale arrangement known as the "compromise," and declare their intention not to be bound by it longer than January 1, 1871.

In regard to the adoption of the Shamokin compromise by the Committee of Conference at their last meeting the *Herald* says it did not have so good an effect as was anticipated a week ago. The following collieries have been idle since then: Trevorton, Buck Ridge, Big Mountain, and Henry Clay No. 1; but the last three, we learn, will start up on the independent system. By this the W. B. A. will lose another stronghold—the last they have in the vicinity of Shamokin. We think the miners made a great mistake in not adhering to the advice of PARKER and the action of their committee. The last movement will tell severely on their organization.

The following collieries are working, or will work, on the independent system: Cameron, Burnside, Bear Valley, Luke Fidler, Frank Gowan, Henry Clay No. 1, Buck Ridge, and Big Mountain.

Anthracite Coal Trade for 1869 and 1870.

The following table exhibits the quantity of Anthracite Coal passing over the following routes of transportation for the week ending October 8, 1870, compared with week ending October 9, 1869.

COMPANIES.	1869. WEEK.	1869. TOTAL.	1870. WEEK.	1870. TOTAL.
*Phila. & Reading R.R	68,686	2,574,022	102,633	2,276,690
Schuylkill Canal	7,373	513,966	27,110	301,325
Lehigh Valley R. R.	9,410	1,672,219	57,811	2,402,427
Lehigh & Sus. R. R.	6,162	582,623	26,771	798,844
Lehigh Canal	564	583,284	26,244	564,603
Scranton North	16,822	283,043	11,976	581,915
" South	8,475	747,445	38,654	1,350,075
Penn. Coal Co., rail	16,181	732,378	25,747	899,626
" " canal		14,658	355	14,351
Del. & Hud. Canal Co.	17,152	864,383	14,105	1,114,298
" " R. R.	2,746	108,274	14,916	367,161
" " south	5,755	74,552	6,277	349,476
Shamokin	14,531	329,498	9,213	363,662
Trevorton	1,239	24,886		67,374
Lykens Valley Coal Co.	1,713	86,065	5,552	112,674
Wyoming South	4,810	221,659	11,430	238,824
Wyoming North	2,371	48,725		
P. N. Y. C. & R. R. Co.			6,352	237,491
Williamstown, Col'y.	29	151,179	6,367	230,068
Short Mountain	2,951	79,859		
Big Lick Colliery				
Total	186,980	9,687,418	391,103	12,268,560
1869			186,980	9,687,418
Increase week and year.			204,123	2,568,442

* Less coal transported for Company's use and Bituminous coal.

Bituminous Coal Trade, 1869 and 1870.

The following table exhibits the quantity of Bituminous Coal passing over the following routes of Transportation for the week ending Oct. 1, 1870, compared with week ending October 2. 1869.

COMPANIES.	1869. Week.	1869. Year.	1870. Week.	1870. Year.
B. & O. R. R.	16,000	764,000	24,504	759,949
C. & O. Canal	15,000	473 000	10,144	476,810
H. & B. T. R. R.	7,089	274,951	....	568,145
Harrisburg & D.	9,901	....	16,235	583,598
L. V. R. R.	....	552		10,943
P. & N.Y. C. & R. Co.	....	....	5,586	198,388
	47,990	1,512,503	56,469	2,597,833

Philadelphia and Reading R. R.

Amount of coal transported on the Philadelphia and Reading Railroad for the week ending Thursday, Oct. 6, 1870:

From St. Clair	40,281 01
" Port Carbon	6,518 13
" Pottsville	4,509 04
" Schuylkill Haven	30,036 02
" Auburn	6,300 12
" Port Clinton	14,853 05
" Allentown and Alburtis	133 13
" Harrisburgh and Dauphin	16,235 12
Total paying freight	118,869 02
Coal for Company's use	3,877 02
Total for week	122,746 04
Previously this year	2,792,757 16
Total	2,915,504 00
To same time last year	3,273,230 12

Schuylkill Canal.

Report of coal transported over the Schuylkill Canal for the week ending Thursday, Octber 7, 1870.

	Tons. Cwt.
From Port Carbon	— —
" Pottsville	— —
" Schuylkill Haven	25,274 00
" Port Clinton	1,836 00
Total for week	27,110 00
Previously this year	274,215 10
Total	301,325 10
To same time last year	513,966 11

Summit Branch Railroad Company.

The following is the quantity of Coal shipped from Williamstown Colliery, for week ending Saturday, October 8, 1-70 | 6,367 15
Same time last year | 29 10

Decrease, Tons	6,338 05
Total amount shipped to date	230,066 18
Same time last year	151,179 09
Increase, Tons	78,889 09

Report of Coal Transported by the Lehigh Coal and Nav. Co.'s Railroads and Canals,

Week ending October 8, 1870—Compared with same time last year.

WHERE SHIPPED FROM	WEEK, 1870. tons ct	WEEK, 1869. tons ct	YEAR 1870. tons cwt.	YEAR, 1869. tons cwt.
Wyoming Region	26217 04	5950 10	934203 03	603316 05
Upper Lehigh Region	3509 02		115900 17	77493 03
Mahanoy Region			1642 18	25 1 01
Hazleton Region	9364 19	93 10	242 94 07	121048 01
Beaver Meadow Region	3557 13		115291 13	93639 11
Mauch Chunk Region	13035 16	1588 15	130283 13	315728 08
Totals	56264 14	7637 01	1540225 11	1213551 09
Increase	48631 13		326674 02	
Decreasq				
DISTRIBUTION.				
Forwarded East of Mch Chunk by Rail	26771 08	6162 11	788844 00	582623 01
Forwarded East of Mch Chunk by Canal	26244 13	564 06	564603 03	583384 04
Delivered at and above Mauch Chunk	936 05	764 05	33372 13	26307 02
Delivered to L. & B. R. R. at Plymouth Bridge	2312 08	141 19	153405 15	16185 19
L. V. R. R. at Sugar N.				5151 03
Totals	56264 14	7633 01	1540225 11	1213551 09
Of the above there was transported on acc'nt of L. C. & N. Co.	15313 01	1946 12	159188 14	337630 07
W.-B. C. & I. Co.	15566 07	2632 06	450752 05	365048 16
Totals.	30879 08	4578 18	609940 19	642885 03
Increase	26300 10			
Decrease			32744 04	

Report of Coal Transported over Lehigh Valley Railroad

For the week ending October 8, 1870, and previously this season, compared with same time last year:

WHERE SHIPPED FROM.	WEEK. Tons. Cwt.	PREV'LY. Tons. Cwt.	TOTAL. Tons. Cwt.
Total Wyoming	11,157 12	490,019 09	501,177 01
" Hazleton	45,130 02	1,662,049 00	1,707,179 02
" Upper Lehigh	178 13	11,174 08	11,353 04
" Beaver Meadow	12,857 16	564,231 08	607,089 04
" Mahanoy	9,509 16	215,926 19	225,436 15
" Mauch Chunk	94 01	849 11	913 12
Total Anthracite	78,928 02	2,974,250 16	3,053,178 18
Bituminous Coal recv'd from Cata. R. R.			
N. C. R. R.			
E. P. R. R.		10,943 00	10,943 00
P. & N.Y. C. & R.R. Co			
Fall Creek			
Schroeder			
Towanda			
Total by rail and canal	78,928 02	2,985,193 16	3,064,121 18
Same time last year	10,529 05	1,934,324 17	1,944,853 02
Increase	68,398 17	1,050,869 19	1,119,268 16
Decrease			
Forwarded East from M'h Chunk by rail	57,801 09	2,344,626 02	2,402,427 11
Same time last year	9,410 00	1,662,809 17	1,672,219 17
Increase	48,391 09	681,816 08	730,207 14
Decrease			

RECAPITULATION.

Forwarded East from M'h Chunk by rail	57,801 09	2,344,626 02	2,402,427 11
To N. C. R. R., at Mount Carmel	44 01	3,222 18	3,266 19
Forwarded North from L. & B. Junction	6,352 15	230,635 06	236,988 01
To L. & S. R. R. at Packerton for rail	92 17	6,680 17	6,773 14
Delivered at M'h Chunk	39 16	935 10	975 06
Delivered on line of road above Mauch Chunk	220 17	8,318 14	8,539 11
Delivered above M. Chunk for use of L. V. R.R.	1,053 01	42,829 06	43,830 07
To L. & S. R.R., at P'n Hav., for railroad	9,835 08	224,816 02	234,671 10
Do. for canal	3,467 18	112,176 01	115,643 19
Total Anthracite	78,928 02	2,974,250 16	3,053,178 18
Bituminous Coal		10,943 00	10,943 00
Total all kinds	78,928 02	2,985,193 16	3,064,121 18

Delaware, Lackawanna, and Western Railroad.

COAL Transported for the week ending Saturday, October 1, 1870.

	WEEK. tons. cwt.	YEAR. tons. cwt.
Shipped North	11,976 19	581,915 15
Shipped South	38,654 02	1,350,075 10
Total	50,631 01	1,931,991 05
For the corresponding time last year,		
Shipped North	16,822 19	285,043 16
Shipped South	8,475 03	747,445 15
Total	25,298 02	1,032,489 11
Increase	25,332 19	899,500 14
Decrease		

Penn. and N. Y. Canal and Railroad Co.

REPORT of Coal Transported via. the Pennsylvania and New York Canal and Railroad Company, for week ending Oct. 11, 1870:

	WEEK.	PREVIOUSLY.	TOTAL.
Anthracite	6,352 01	231,139 05	237,491 06
Bituminous	5,586 00	192,802 00	198,387 00
Total, Ant. and Bit.	11,938 01	423,941 05	435,879 06

Delaware and Hudson Canal Company.

Coal mined and forwarded by the Delaware and Hudson Canal Company, for week ending Saturday, October 8, 1870.

	WEEK.	SEASON.
North	28,856 03	1,668,908 19
South	6,277 12	349,476 09
Total	35,133 15	2,018,385 08
CORRESPONDING TIME IN 1869:		
North	41,472 11	925,994 06
South	5,765 05	72,835 16
Total	47,237 16	998,830 02
Decrease North	12,616 08	Inc. 742,914 13
Increase South	512 07	Inc. 276,640 13
Total Decrease	12,104 01	Inc. 1,019,555 06

The following is a statement of coal transported by the Delaware and Hudson Canal Company, for the week ending October 8, 1870.

	WEEK.	SEASON.
By Del. and Hud. Canal	14,105 00	1,114,298 00
By Railroad	14,916 00	367,161 00
South	6,277 00	349,476 00
Total	35,298 00	1,830,935 00
Corresponding time in 1869.		
By Del. and Hud. Canal	17,152 00	864,383 00
By Railroad	2,746 00	108,274 00
South	5,765 00	74,552 00
Total	25,663 00	1,047,219 00
Increase	783,716 00	

Pennsylvania Coal Company,

Shipments of Pittston Coal for the week ending Oct. 8, 1870.

	1870. WEEK.	1870. YEAR.	1869. WEEK.	1869. YEAR.
By Railway	25,347 10	889,868 15	16,181 17	752,078 18
" Canal	355 01	14,351 09	.....	14,658 01
Total	25,702 11	803,968 04	16,181 17	766,736 19
Increase, 1870, 137,221 05 tons.				

Harrisburgh and Dauphin Coal Trade.

The following is the amount of Bituminous Coal transported via the P. and R. R. for the week ending Oct. 6, 1870:

	Tons.
For week	16,235 12
Previously this year	583,598 14
Total	599,834 06
Same week last year	9,901 08

Shipments of Cumberland Coal

for the week ending Saturday, October 8, and for the year 1870:

SHIPPED BY	B. & O. R. R.	C. & O. CANAL.	TOTAL.
Cooke M.	.....	.....	.....
Borden	1 522 07	1,384 12	2,906 19
Consolidation	3,710 09	1,845 05	5,555 21
Spruce Hill	460 09	.....	460 09
Midlothian	59 11	1,040 12	1,100 03
H. and Baltimore	29 17	1,228 12	1,258 09
do Va M	1,404 01	.....	1,404 01
V C & I Co	1,243 15	.....	1,243 15
G. C. C. and I.	1,570 05	.....	1,570 05
Maryland	3,636 03	2,646 19	6,283 02
American	1,323 17	1,998 02	3,321 19
Atlantic	1,146 01	.....	1,146 01
Piedmont	1,188 00	.....	1,188 00
Swanton	1,243 09	.....	1,243 09
Barton	924 00	.....	924 00
Potomac	1,403 10	.....	1,403 10
Franklin	1,625 06	.....	1,625 06
George's Creek M. C.	390 00	.....	390 00
Big Vein	1,623 14	.....	1,623,14
Total week	24,504 14	10,144 02	34,648 16
Previous	735 445 02	466,665 18	1,202,111 00
Total year	759,949 16	476,810 00	1,236,756 16

Prices of Coal by the Cargo.

[CORRECTED WEEKLY.]

SCHUYLKILL.	AT NEW YORK, October 14. R. A.	W. A.	AT PHILADELPHIA, October 14. R. A.	W. A.
Lump	$— —	$5 00	4 75	4 50
Steamer	— —	5 00	— —	4 50
Broken	— —	5 50	— —	4 50 to 4 75
Egg	5 75 to 6 50	5 50 to 5 75	— —	4 50 to 4 75
Stove	5 75to 6 50	5 75	6 25	— — 4 50 to 4 75
Chestnut	4 50 to 5 75	7 25	4 50	— — 4 25 to — —
Pea	— —		— —	— —
LEHIGH.				
Lump, (along side)	5 85		— —	— —
Broken	5 75		— —	— —
Egg	5 85		— —	— —
Stove	6 10		— —	— —
Chestnut	5 10		— —	— —
Pea	— —		— —	— —
SPECIAL COALS.*				
Diamond Vein	R. A.	6 50	— —	— —
New England	"	— —	— —	— —
Locust Dale	W. A.	6 25	— —	— —
Honey Brook, Le'h	W. A.	4 75 to 5 75	— —	— —
Spring Mountain	"	4 75 to 5 75	— —	— —
Sugar Creek	"	4 75 to 5 75	— —	— —
Sugar Loaf	"	4 50 to 5 75	— —	— —
Old Comp'y's.	"	4 75 to 5 75	— —	— —
Cross Creek	"	4 75 to 5 75	— —	— —
Enterprise	"		— —	— —
Girardville	"		— —	4 75
McMichael	"		— —	4 75
Shamokin	"	5 50	5 25	— —
Lykens Valley	"		5 75	— —
Broad Top	"	5 50	— —	— —
Hill & Harris	"		4 75	— —
Henry Clay	"		5 00	— —
Powelton	"	5 50	— —	4 75

(*Dealers in these coals may be found in our advertising columns.)

Prices for Coal at Mauch Chunk.

	F.L.	Bro.	Gra.	Eg.	Sto.	Cst.
Lehigh	$3 00	$3 75	$3 75	$3 75	$4 00	$3 00
Wilkesbarre	3 00	3 75	3 75	3 75	4 00	3 00

For freight to Elizabethport and to New York see "Freights."

BITUMINOUS COALS.

Kittaning Coal Co.'s Phœnix Vein...f.o.b. at Phila.	$5 00
Lemon " "	4 75
Cumberland Vein Coal	4 75
Cumberland C. & I. Co.'s on board N. Y.	7 00
Maryland Coal Co. "	7 00
Consolidated Coal Co.'s " "	7 00

Company Coals.

	L.	Str.	Gra.	Eg.	Sto.	Ches.
Scranton at E. Port	4 25	4 50	5 25	5 00	5 50	4 50
Pittston at Newburgh	4 85	4 90	5 10	5 25	5 50	4 50
Lackawana at Rondout	4 50	4 50	4 60	5 00	5 50	4 50
Wilk'b're at Hoboken	4 50	4 50	5 25	5 25	5 75	4 50
Old Co. Lehigh at Pt. Johnston	5 50	5 40	5 40	5 50	5 75	4 75
Lehigh at E. Port	5 25	— —	5 25	5 50	5 75	4 50

For freights to different points, see "Freights."

Prices at Baltimore—October, 1870.

Wholesale Prices to Trade.

Wilkesbarre, by cargo or car load	$5 80@—
Pittston and Plymouth, do	5 60@5 75
Shamokin Red or White Ash, do	— —@6 00
Lykens Valley Red Ash, do	6 25@—
Zerba Valley	5 25@—
Treverton	6 10@—
By retail, all kinds per ton of 2240 lbs.	7 25@8 25
Georges Creek & Cumberland f. o. b. at Locust Point for cargoes	4 60@4 75
Fairmont and Clarksburg gas, f. o. b. at L. Point	6 00@6 50

Prices at George'n, D.C., & Alexandria, Va.

October, 1870.

George's Creek and Cumberland f. o. b. for shipping..$4 55

Prices at Havre de Grace, Md.

Wilkesbarre and other White Ash for cargoes	$— —@5 50
Lykens Valley	— —@6 25
Shamokin Red or White Ash	— —@5 75
Trevorton and Zerba Valley	— —@6,00

Prices of Gas Coals.

October, 1870.

PROVINCIAL.

Corrected weekly by Louis J. Belloni, Jr. 73 Pine st., N.Y. Duty, $1 25, gold.

	Coarse.	Slack.
Block House	$1 75	@— 75
Gowrie	1 75	@— 75

Corrected by Bird, Perkins & Job, 86 South street.

	Coarse.	Culm of Coal.
Pictou	$2 25	@1 25
Sydney	2 25	@— 80
Lingan	1 75	@— 80
Little Glace Bay	1 75	@1 00
Caledonia	1 60	@— 80

A discount from the prices of the coarse Coal on purchase of 5000 tons and upwards. Duty $1 25 per ton, gold, on the coarse coal. 25 per cent. ad valorem on the Culm of Coal.

AMERICAN.

	Coarse.	Slack. Currency.
Fairmount Gas Coal Co. of N. Y.	7 50	@— —
Despard Coal Co	$7 50	@— —
Penn	— —	@— —
Newburg Orrel Gas	— —	@— —
West Fairmount Gas Coal	8 00	@— —

AT PHILADELPHIA.

Powelton $7 80

Prices of Foreign Coals.

October, 1870.
Duty $1 25 per ton.

Corrected weekly by PARMELE BROS., No 32 Pine street, New York.

Liverpool Gas Caking	$ 2 00@— —
" " Cannel	11 50@12 50
" House	15 00@16 00
" " Orrel	12 00@14 00

Per ton 2,240 lbs., ex-ship.

PRICES FROM YARD.

Liverpool House Orrel, screened	$16 00@17 50
" " Cannel	18 00@20 00

Per ton 2,000 lbs. delivered

Rates of Transportation to Tide Water.

BY RAILROAD.

TO PORT RICHMOND, PHILADELPHIA.

Philadelphia and Reading Railroad, from Port Carbon	$2 00
Less drawback of 80 cents on all Coal shipped east of New Brunswick and south of Cape Henry.	

MAUCH CHUNK TO ELIZABETHPORT.

L. V. Railroad from Mauch Chunk to Easton	$ 81
C. R. R., N. J., Easton to Elizabethport	1 15
Shipping expenses at Elizabethport	25
Warfage	10
Total	$2,31

MAUCH CHUNK TO PORT JOHNSON.

L. V. R. R., or L. & S. R. R. from M. C. to Easton	$ 81
C. R. R., of N. J., Easton to Pt. Johnson	1 19
Shipping expenses	25
Warfage	10
Total	$2 35

TO HOBOKEN.

L. V. R. R., Mauch Chunk to Easton	$ 81
Morris & Essex R. R. Easton to Hoboken	1 19
Shipping expenses	25
Warfage	10
Total	$2 35

TO SOUTH AMBOY.

L. V. R. R.	81
B. & D. R. R. / Cam. & Am. R. R.	1 09
Shipping Expenses	25
Total	$2 15

PENN HAVEN TO ELIZABETHPORT.

L. V. RR. Penn Haven to Easton	95
C. RR. of N. J. Easton to Elizabethport	1 15
Shipping expenses	25
Wharfage	10
Total	$2 45

BY CANAL.

Via Schuylkill Canal.

TO PHILADELPHIA.

From Schuylkill Haven	$1 07
" Port Carbon	1 10
" Port Clinton	1 00

TO NEW YORK.

From Schuylkill Haven	$1 70

Via Lehigh Canal.

TO PHILADELPHIA.

Lehigh Canal	$0 70
Freight and towage	1 07
Total	$1 77

TO NEW YORK.

Lehigh Canal	$ 40
Morris " / Freight. / Towing	2 10
Total	$ 2,50

TO JERSEY CITY.

Lehigh Canal	$ 40
Morris " / Freight	2 05
	2 45
For re-shipment	2 19
Total	

Via Delaware and Raritan Canal.

TO NEW YORK.

Lehigh Canal	$ 40
Delaware Division Canal	30
Delaware and Raritan Canal	35
Freight	1,25
Towage	20

TO NEW BRUNSWICK.

Lehigh Canal	$ 40
Delaware Division Canal	30
Delaware and Raritan Canal	1 35
Freight	1 05
Total	$ 2,10

For Re-shipment—30 extra for shipping, less 10 cents. drawback.

Towing Rates.

TO EASTERN PORTS.

	Per Ton.
To New Haven	$ 40
Bridgeport	40
Southport	40
Westport	40
Norwalk	40
Stamford	40
	Per Boat.
Greenwich	$70 00
Port Chester	80 00
Mamaroneck	70 00
Glen Cove	60 00
New Rochelle	55 00
East Chester	60 00
West Chester	30 00
White Stone	30 00
College Point	25 00
West Farms	25 00
Flushing	30 00
Harlem and Mott Haven	20 00
Port Morris	20 00
Ninety-first street and Astoria	15 00

Boats beyond Port Chester, with less than 200 tons, $80 per Boat.

TO RIVER PORTS

Boats of 150—250 Tons.	Per Ton.
To Manhattanville	8 cents
Spuyten Duyvil	8 "
Yonkers	8 "
Hastings	10 "
Piermont	12 "
Dobbs' Ferry	12 "
Nyack	14 "
Tarrytown	15 "
Sing Sing	16 "
Croton Landing	17 "
Haverstraw	17 "
Verplanck's	17 "
Peekskill	18 "
West Point	20 "
Cold Spring	20 "
Newburgh	18 "
Poughkeepsie	22 "
Rondout	24 "
Boats of 100 Tons	Per Boat
To Manhattanville, and Return	$11 00
Spuyten Duyvil	13 00
Yonkers, "	15 00
Sing Sing, "	20 00
Peekskill, "	25 00

Foreign and Provincial Freights.

October, 1870.

Foreign.

Newcastle and Ports on Tyne, per keel of 21 1-5 tons	£14 00@£16 00
Liverpool, 5 per cent primage	13s. @16. ton

TO NEW YORK.

Provincial

Sidney	$—
Lingan	—
Cow Bay	—
Port Caledonia	—
Little Glace Bay	—

TO BOSTON.

Sydney	$—
Lingan	—
Cow Bay	—
Port Caledonia	—
Little Glace Bay	—

Freights.—OCTOBER, 1870

TO EASTERN PORTS.	From Philada.	From E Port and Port Johnson.	From Newburg....	From Rondout....
Amesbury	$2 50	$2 00	$	$
Bangor	2 25	1 60	1 60	
Bath	2 25	1 75	— —	
Boston	2 35	1 65	2 25	1 90
Bridgeport	1 75	1 00	1 10	1 20
Bristol	2 00	1 40	1 40	
Cambridgeport	2 35	2 00		
Derby	2 00	1 20		
Dighton	2 30	— —	1 45	
East Cambridge	2 35	2 00		
Fall River	2 50	1 40	1 40	
Hackensack	1 75	1 00		
Hartford	2 50	1 50		
Jersey City	1 35	60		
Middletown	2 25	1 25		
Mystic	— —	1 25	1 30	
New Bedford	2 00	1 40		
Newburyport	2 50	1475		
New Haven	1 90	1 00	1 10	1 20
New London	2 00	1 20	1 25	1 30
Newport	2 00	1 40	1 40	
New York	1 35	60	70	
Norwalk	1 80	1 00	1 05	
Norwich	2 00	1 30	1 35	1 40
Pawtucket	2 25	1 50	1 60	
Portland	2 25	1 75		
Portsmouth, N. H	2 25	1 85		1 85
Providence	2 00	1 40	1 45	1 45
Rockport	2 10	1 65		
Saco	2 25	1 75		
Sag Harbor	1 70	1 20	1 30	
Salem	2 25	1 65	2 25	2 35
Stamford	2 00	1 00	1 00	
Stonington	2 00	1 30	1 25	
Taunton	2 30	2 00		
Warren	— —	1 40	1 45	
Washington	1 25			
TO RIVER PORTS.				
Albany		90	- 60	
Catskill		— —	- 50	
Cockaackie		— —	- 50	
Coeyman's		— —	- 75	
Cold Spring		— —	- 35	
Fishkill		— —	- 30	
Haverstraw		50	- 60	
Hudson		— —	- 50	
New York		— —	- 70	
Nyack		60	- 60	
Poughkeepsie		— —	- 35	
Rhinebeck		— —	- 30	
Rondout		— —	— —	
Saugerties		— —	- 40	
Sing Sing		— —	- 75	
Stuyvesant		— —	- 55	
Tarrytown		80	- 75	
Troy		90	- 75	
West Point		— —	- 35	
Yonkers		40	- 60	

METALS.

NEW YORK, October 15, 1870.

IRON.—Duty: Bars, 1 to 1½ cents ℔ lb; Railroad, 70 cents ℔ 100 lbs.; Boiler and Plate, 1¼ cents ℔ lb; Sheet, Band, Hoop, and Scroll, 1¼ to 1¾ cents ℔ lb; Pig, 9 ℔ ton; Polished Sheet, 3 cents ℔ lb.

	Store Prices.
Pig, Scotch No. 1, ℔ ton	32 50@36 00
Pig, American, No. 1	33 00@— —
Pig, American, No. 2	31 00@32 00
Pig, American, Forge	27 00@29 00
Bar, Refined, English and American	—@75 00
Bar, Swedes, assorted sizes (gold)	85 00@100 00
	Store Prices, Cash
Bar, Swedes, ord'y sizes, less 5 ℔ ct	— —@110 00
Bar, Refined " "	80 —@ 85 00
Bar, Common " "	75 00@ 80 00
Scroll " "	97 50@130 —
Ovals and half-round " "	100 —@125 —
Band " "	95 —@ — —
Horse Shoe " "	95 —@ — —
Rods, ⅜ to 3-16 inch " "	85 —@120 —
Hoop " "	105 —@150 —
Nail rod, less 5 ℔ ct	— 7@— 7½
Sheet, Russia, as to Nos. (gold)	11 @—11½
Sheet, Single, D. and T. Common	—4¾@— 6
Sheet, Galv'd, Nos. 14 to 26 10 and 12c. Nos. 27, 28, and 29, 13@14	
Rails, English (gold), ℔ ton	57 00 @59 00
Rails, American, at Works in Pa	70 00 @71 00

STEEL.—Duty: Bars and ingots, valued at 7 cents ℔ ℔ or under, 2½ cents; over 7 cents and not above 11, 3 cents ℔ lb; over 11 cents, 2½ cents ℔ lb, and 10 ℔ cent ad val. (St prices.)

English Cast (2d and 1st quality) ℔ lb	— 15 @— 18
English Spring (2d and 1st quality)	— 7 @— 10
English Blister (2d and 1st quality)	— 10 @— 17
English Machinery	— 11½@— 14
English German (2d and 1st quality)	— 13 @— 15
American Blister "Black Diamond"	— — @— 12
American, Cast, Tool do.	— — @— 12
American, Spring, do.	— 9 @— 11
American Machinery, do.	— — @— 12
American German, do.	— 9 @— 12

COPPER.—Duty: Pig, Bar, and Ingot, 5; old Copper 20 cents ℔ lb; Manufactured, 45 per cent. ad val.

	All Cash.
Copper, New Sheathing, ℔ lb	— @— 30
Copper Bolts	— @— 30
Copper Braziers, 16oz. and over	— @— 30
Copper Nails	35 @— 36
Copper, Old Sheathing, &c., clean	— @— —
Copper, Chili Pig	— @— —
Copper, American Ingot	— @— 21¼
Yellow Metal, New Sheating	— @— 22
Yellow Metal Bolts	24 @— —
Yellow Metal Nails	— @— 22

LEAD.—Duty: Pig, $2 ℔ 100 lbs.; old Lead, 1½ cents ℔ lb; Pipe and Sheet, 2½ cents ℔ lb.

Galena, ℔ 100 lbs	$— — @— —
Spanish (gold)	6 30 @6 35
German, do.	6 30 @6 35
English, do.	6 30 @6 62½
Bar (net)	7 75 @8 00
Pipe (net)	7 75 @— —
Sheet	7 00 @— —

TIN.—Duty: Pig, Bars, and Blocks, 15 ℔ cent. ad val.; Plate and Sheets and Terne Plates, 25 ℔ cent. ad val.

	Gold ℔ lb.
Banca	36½@36¾
Straits	33¾@—
English	32¼@32½

PLATES.

Fair to Good Brands.	*Gold.*	*Currency.*
I. C. Charcoal, ℔ box	$8 50 @8 87½	$10 00 @10 50
I. C. Coke	7 25 @8 —	8 50 @ 9 50
Coke Terne	5 87½@6 75	7 00 @ 8 00
Charcoal Terne	7 50@8 —	9 00 @ 9 50

SPELTER.—Duty: In Pigs, Bars, and Plates, $1 50 ℔ 100 lb

	Gold.
Plates, Foreign ℔ 100 lbs.	$— — @ 6 12½
Plates, Domestic ℔ lb.	08½@— 11½

REMARKS.

IRON.—The demand for Scotch Pig has been rather light since our last, but, as there is no improvement in the supply, full prices prevail; we have only to note a sale of 150 tons Gartsherrie on private terms. American meets with very little inquiry, and prices have a softening tendency; 300 tons No. 1 Hudson sold on private terms. There has been a good demand for both old and new Rails, and prices remain firm; the sales are 5,000 tons new English, Southern delivery, on private terms; 1,000 do. old Double-headed, to arrive at Philadelphia, $30, gold; and 500 do. Bridge, on terms not made public. Trade in Refined Bar, from store, continues on a very moderate scale, and prices are steady at figures ($80 for usual sizes) barely covering cost of importation; at present mill quotations in Philadelphia, American Refined could not be sold here without a loss of several dollars per ton; ¾ inch Trenton Iron Company round Rod sells in lots at $100, and 5-16 inch at $97 50, cash. We note a sale of 100 packs Russia Sheet on private terms.

TIN.—At the Duch Trading Company's sale, which took place at Amsterdam on the 7th instant, we learn by Cable that 80,000 slabs were sold at 75¾ florins, against 49,500 slabs disposed of at their April sale at 83 florins; the price realized on the 7th instant is equal to £131 in London, and that market is quoted at £5 higher since the sale, bringing English up to £129; here, these advices so far have had but little, if any, effect, as the demand for Pig is very limited, dealers' wants being supplied by parcels bought some time ago to arrive, and now here; we quote about as before—say, Straits, 33¾c.; English, 32½ @ 32¾c.; and Banca, 36½ @ 36¾c.—all gold; 200 slabs of the latter sold at a private price. Plates are also very dull, stocks are full and accumulating, and as they are rather pressed on the market, there is, here and there, a little shading of prices, though not sufficiently defined as to be called a general decline; sales have been made of 200 boxes low grade Charcoal Tin at $8 37½; 100 do. I. C. Charcoal Wasters, at $7 87½, both gold; and 500 do. at Charcoal Terne at a private sale.

COPPER.—The manufactures of Copper and Yellow Metal are steady at our quoted rates. Ingot has moved more freely, and the market is stronger, though no higher. The transactions embrace 400,000 lbs. at 21 @ 21½c. for Baltimore and Lake Superior, for immediate delivery, and 21¾ @ 22c. for November and December. The Baltimore Company is making but little, and this description commands now about as much as Lake, both kinds closing firm at 21½c. for spot lots.

LEAD.—Since our last, the market for Foreign pig has been very quiet, and we hear of none but small sales; ordinary Foreign may be quoted nominally at $6 30 @ $6 35, gold; Bar, 7¾ @ 8c.; Pipe, 7¾c., and Sheet, 8c., net cash.

STEEL.—Is in fair demand at previous store quotations: we quote best Enghsh Cast at 18c., and American, 17c., net cash.

SPELTER—Foreign remains very dull; we quote nominally parcels on the spot at $6 @ $6 12½c., and to arrive, $5 87½, gold; 20 tons American Zinc Works sold at 8¾., currency.

ZINC.—Am. Oxide, 6¼@7c.; French do., 10½ @ 11; Metal do., 10¼.

MANGANESE—Lump, 4c.; Powder, 4½c.

Mining Stocks.

NEW YORK, Oct. 14, 1870.

Gold Mining Stocks are weaker, and more active sales of 500 Central are reported b, 30., at 18c., and 500 Grass Valley, b, 30 at 29c.; Benton is quoted at 3c.; Black Hawk, 26 @ 40c.; Central, 17@19c.; Consolidated Gregory, 74 @ 80c.; Grass Valley, 26c.; Lacross, 8c.; New York and Eldorado, 20c.; Quartz Hill, 17c.; Smith & Parmalee, 55 @ 70c.

PETROLEUM.—Home Petroleum has considerably advanced, and with this exception all stocks on the list have declined since last report. We do not hear of any sales, and from indications we infer that stocks are suffering from masterly inactivity. The following table exhibits the condition of the market as compared with last week:

	Oct. 7. *Bid.*	*Asked.*	Oct. 14. *Bid.*	*Asked.*
Bennehoff	22	—	20	40
Bergen Coal and Oil	—	40	—	—
Blood Farm	—	—	—	—
Brevoort	50	—	—	50
Buchanan Farm	—	45	—	40
Central	55	65	58	65
Home Petroleum	1 50	—	1 70	2 50
N. Y. and Alleghany	1 50	—	—	—
National	—	—	—	1 50
Northern Light	—	75	—	—
Phillips' Pet	15	—	—	—
Pithole Creek		1 25	—	1 10
Rathbone	—	40	—	—
Rynd Farm	28	—	28	31
Second National	—	—	—	—
United Petroleum Farms	15	20	15	20
United States	60	75	—	75

San Francisco Stock Market.

All of the stocks on the Comstock list have very materially declined since our last report, with exception of Amador, which has advanced to 250. We append the following list of dividends, which were disbursed during the month of September:

NAME.	RATE.	AMOUNT.
Black Diamond Coal Co	½ ℔ cent	$25,000
Union Pacific Salt Co	¾ ℔ cent	2,250
Chollar-Potosi Mining Co	$2 50 ℔ share	70,000
Eureka (Cal.) Mining Co	10 ℔ share	40,000
Golden Chariot (Idaho) M. Co	2 ℔ share	20,000
Hale and Norcross Mining Co	5 ℔ share	40,000
Sierra Nevada Mining Co	50c. ℔ share	7,500
Union (Cal.) Mining Co	1 ℔ share	5,000

The last previous dividend of the Golden Chariot Mining Company was in June, 1869; and of the Sierra Nevada Company, in November, 1869. The dividends paid by the Chollar-Potosi and Eureka Mining Companies in the month of September were considerably larger than for some time past.

(By Telegraph.)

PER SHARE.	Oct. 1.	Oct. 11.
Savage	38¼	37
Yellow Jacket	28	27½
Kentuck	36	28
Chollar Potosi	54½	52¼
Gould & Curry	112	83
Belcher	1¼	4½
Imperial	—	30
Amador	249	250
Crown Point	—	—
Ophir	—	—
Alpha	—	—
Hale & Norcross	—	—
Empire Mill	—	—

The Slate Trade.

NEW YORK, Oct. 15, 1870.

We are very sorry that for the present week we are unable to publish returns from our correspondent at Hydeville. A delay in the mails is probably the cause. We hope that we shall be able to go on regularly next week. In a short time, our arrangements will be complete for making returns from all stations shipping slate from Vermont. Our correspondent at Middle Granville writes the encouraging word that all the slate quarries in the New York slate region are now at work. Three of them have been idle for more than a year. They are all going on contracts.

Prices of Slate in New York.

[Corrected weekly.]

(A "square" represents 100 superficial feet.)

PRICES OF ROOFING SLATE.

Vermont purple, 1st quality, per square	$6 50@ 7 00
" green, 1st " "	6 50@ 7 00
" red, 1st " "	15 00@16 00
" variegated, "	5 75@ 6 25
Pa. b'k and d'k blue, 1st qual., "	7 00@ 8 00

VERMONT SLATE TRADE.

REPORT of Slate Shipped from Middle Granville, N.Y., via the R. & S. R. R., for the week ending October 8, and for the year 1870.

ROOFING SLATE.

NO. OF SQUARES.	Week.	Prev'ly.	Year.
Penrhyn Slate Co	1,000	3,765	4,765
New York Slate Co	....	2,950	2,950
Middle Granville Slate Co	60	446	506
*American Slate Co	....	....	....
Benj. Williams	75	1,053	1,128
Jones & Williams	....	70	70
Eagle Slate Co	....	153	153
H. W. Hughes		151	151
J. D. Jones		35	35
Total	1,135	8,623	9,758

*Penrhyn and American Co.'s shipments are consolidated for this season.

MANTELS, &C.

NO. OF CASES.	Week.	Prev'ly.	Total.
Eagle Slate Co	.....	.....	.....
Penrhyn Slate Co	158	1,427	1,585

MILL STOCK.

NO. OF CASES SHIPPED BY	Week.	Prev'ly	Total.
Eagle Slate Co	cars 1	15	16
Penrhyn Slate Co	"		

Hydeville, Vt.

REPORT OF SLATE SHIPPED FROM HYDEVILLE, VT., VIA R. & S. R. R., FOR THE WEEK ENDING OCTOBER 8, AND FOR THE YEAR 1870.

ROOFING SLATE.

	WEEK.	PREVIOUSLY.	YEAR.
Eagle Slate Co	sqs. ..	185	305
Western Vermont Slate Co	..	20	20
Blue Slate Co	..	280	320
The Evergreen Slate Co	..	340	591
Forest Slate Co	..	80	80
West Castleton	..	90	90
E. D. Billings	..	47	47
R. M. Copeland	..	80	80
W. E. Williams	..	80	80
Total	..	1202	1613

MILL STOCK.

Eagle Slate Co	.... feet	..	1294ft.

FINISHED MANTELS.

West Castleton Slate Co. box	...	201	249
Forest Mining "	..	71	136
Total	....	272	385

BILLIARD BEDS AND BLACK BOARDS.

Eagle Slate Co	box. ..	20	42
Western Vermont	..	30	31
West Castleton Slate Co	..	49	149
Total	..	99	222

TILE.

Eagle Slate Co	feet	..	1407

PENNSYLVANIA SLATE TRADE.

SHIPMENTS OF SLATE OVER THE LEHIGH VALLEY, AND LEHIGH AND SUSQUEHANNA R. R., AND THE LEHIGH CANAL:

For the week ending October 8, 1870.

LEHIGH VALLEY R. R.

ROOFING SLATE.

Jones & Williams	210 squares.
Jones & Town	105 "
Lehigh Slate Co	105 "
Columbia Slate Co	70 "
D. Williams & Co	70 "
Saylor & Morgan	35 "
J. Anthony	35 "
Kuntz & Woodring	35 "
D. Thomas	35 "
Girard Slate Co	35 "
American Slate Co	35 "
Locke Slate Co	35 "
Total	805 "

SCHOOL SLATES.

A. W. Lerch	20 cases.
D. Williams	36 "
Locke Slate Co	13 "
Lehigh Slate Co	16 "
Total	95

MANTELS.

Lehigh Slate Co	11 cases.
Yenkes & Martin	38 "
Total	49 "

BLACK BOARDS.

Lehigh Slate Co	10 cases.

LEHIGH AND SUSQUEHANNA R. R.

ROOFING SLATE.

Eagle Slate Co	70 squares.
Twin City Slate Co	70 "
Thos. W. Parry	35 "
T. Beck & Co	35 "
Thomas Kuntz	35 "
J. J. Griffith	35 "
A. W. Lerch	22 "
National Slate Co	35 "
Continental Slate Co	16 "
Total	393 "

LEHIGH CANAL.

ROOFING SLATE.

Heimbach Slate Co	335 "

	Week.	Previously.	Total for Year.
L. and S. R. R.	353	7,167	7,520
L. V. R. R.	805	16,867	17,672
Lehigh Canal	335	3.027	3,362
Total	1,493	27,061	28,554

American Product of Gold and Silver.

THE following remarks are taken from the New York *Shipping and Commercial List*. The closing remarks of the editor are especially worthy of perusal, and have our hearty endorsement: "Notwithstanding the large exports of gold and silver during 1869 and 1870, the supply of the precious metals is considerably larger, through the steady rate of production, than at the corresponding period last year. It is evident that we have the ability to resume specie payments without much longer delay. The estimated production of gold and silver in the United States in 1869, is stated by the Commissioner of Mining Statistics, upon a bullion basis, at $63,500,000, distributed as follows: California, $20,000,000; Nevada, $14,000,000; Oregon and Washington Territory, $4,000,000; Idaho, $7,000,000; Montana, $12,000,000; Colorado and Wyoming, $4,000,000; New Mexico, $500,000; Arizona, $1,000,000; other sources, $1,000,000. There has been a considerable faling off in the product of the placer mines of California, Oregon, Idaho, and Montana, but this has been more than met by the increase arising from quartz mining. This fact goes to prove the necessity for the introduction of proper machinery and scientific knowledge into the mining regions. Placer mining bears about the same relation to quartz mining that primitive systems of agriculture bear to the scientific methods of modern times. Quartz mining is the hope of our future bullion supply. Scientific schools are graduating accomplished engineers. The moment they are seconded by capital, this kind of mining will receive an impetus never before experienced. Well-educated men, who have ability to prospect and locate mines, direct operations, employ machinery, and attend to every detail, will invite an influence to the gold-bearing regions which has hitherto kept aloof. The day is fast coming when the paper corporations, that actually prevent development by their imaginary claims, will pass away, and actual corporate energy will be substituted. The Government has been importuned to establish a national school of mining and metallurgy, but it has thus far refused. Some of our colleges, however, have taken the matter in hand, and the country will profit by the knowledge thus disseminated."

The Continuity of the Caseous and Liquid States of Matter.

IN a paper on this subject, read before the Royal Society of London, Dr. THOMAS ANDREWS gives an account of various experiments made by him, during a series of years, upon gases, especially describing the combined effects of heat and pressure upon carbonic acid gas at temperatures varying from 13° C. to 48° C., and at pressures ranging from 48 to 109 atmospheres. The temperature at which this gas ceases to liquefy by pressure, he finds to be 30.92° C., or 88° F., and this he calls the critical point. Although liquefaction does not occur at temperatures a little above this point, a very great change of density is produced by slight alterations of pressure, and the flickering movements are conspicuous, which render fainter the surface of demarcation between the liquid and gas. As the direct result of his experiments, he concludes that the gaseous and liquid states are only widely-separated forms of the same condition of matter, and may be made to pass into one another by a series of gradation so gentle that the passage shall nowhere present any interruption or breach of continuity. From carbonic acid as a perfect gas to carbonic acid as a perfect liquid, the transition may be accomplished by a continuous process, and the gas and liquid are only distant stages of a long series of continuous changes. Under certain conditions of temperature and pressure, carbonic acid finds itself, it is true, in a state of instability, and suddenly passes, without change of pressure or temperature, but with the evolution of heat, to the condition which, by the continuous process, can only be reached by a long and circuitous route.

The author discusses the question as to what is the condition or state of carbonic acid when it passes at temperatures above 31° C. from the ordinary gaseous state down to the volume of the liquid, without giving evidence during the process of the occurrence of liquefaction, and arrives at the conclusion that the answer to this question is to be found in the intimate relations which subsist between the gaseous and liquid states of matter. In the abrupt change which occurs when the gases are compressed to a certain volume at temperatures below the critical point, molecular forces are brought into play which produce a sudden change of volume; and during this process it is easy to distinguish, by optical characters, the carbonic acid which has collapsed from that which has not changed its volume. But when the same change is effected by the continuous process, the carbonic acid passes through conditions which lie between the ordinary gaseous and liquid states, and which we have no valid grounds for referring to the one rather than to the other. Nitrous oxide, hydrochloric acid, ammonia, sulphuric ether, sulphide of carbon, all exhibited critical points when exposed under pressure to the required temperatures. The author proposes for the present arbitrary distinction between vapors and gases, to confine the term vapor to gaseous bodies at temperatures below their critical points, and which therefore can be liquefied by pressure, so that gas and liquid may exist in the same vessel in the presence of one another.—*Tribune.*

Papers on Iron and Steel.

By W. MATTIEU WILLIAMS.

II.

A VERY COSTLY AND VEXATIOUS FALLACY.

THE greatest enemy to steel is phosphorus; one-tenth per cent. is sufficient to produce serious deterioration, and even to render the harder varieties of steel utterly worthless. As our common English pig iron is made from clay iron stones, many of the nodules of which contain, as nuclei or otherwise, the remains of fishes and other animal matter, they are exceptionally rich in phosphorus; and thus all the difficulties of steel-making are greatly increased in this country. There are few results in connection with the progress of British industry of which we have better reason to be proud than our pre-eminence as steel-makers, in spite of the greatest natural disadvantages; and this is the more remarkable from the fact that so great a triumph has been gained by illiterate men, who have achieved it by following out with a remarkably sound though unaided sagacity the strict method of true Baconian investigation. Whenever I meet a formulating, book-stuffed pedant, I love to tell him of the great unconsidered fact, that while the learned men of the middle ages were muddling their intellects with worthless disputations, the artisans of that period were true inductive philosophers, and that the revival of science only commenced when the men of the universities adopted the method which had always been followed by the men of the workshop.

If the men of the universities have outstripped the men of the workshop in recent times, it is simply due to the fact that science has kept systematic record of its achievements, by means of which each worker has the full benefit of the labors of his predecessors and fellow-workers, and it is able to start from the point where these left off; whereas the workshop observers and experimentalists have worked with little or no systematic co-operation. If such co-operation only among one set of investigators has done so much, what may we not expect when it shall not only be extended to the other, but when both sections shall co-operate with each other. This technical and scientific co-operation is the great want of the present age. The artisan needs scientific education, and the professors of science have much to learn from the great mass of facts included in the practical experience of the workshop.

But I must not at present be carried further away into this tempting digression, but return to my main subject by anticipating an objection which will probably be made. The manufacture of puddled steel may be supposed to refute all I have said regarding the impracticability of producing steel directly from English pig iron. If steel fit for the manufacture of files, chisels, etc., could be made from ordinary English pig iron by this process, all my statements certainly would be refuted, for puddled steel is simply made by checking the oxidation, and arresting it at such a point that some of the carbon in the pig iron shall remain unburnt.

The facts connected with the manufacture of puddled steel, which bear upon the present subject, are as follows: First, puddled steel of merchantable quality cannot be made at all from *common* English pig iron. Second, the manufacture of puddled steel has been much more successful on the continent than in England. Third, only *mild* steel, and that of an inferior quality, is made by this process from English iron.

Referring to the first fact, I may mention there is a great deal of mystery, and there have been a great many failures and much waste of labor, fuel and iron in carrying out this process in England. In many forges where it has been tried it is now altogether abandoned, and where it is carried on with any degree of success there is usually much secrecy maintained. Now, the mystery is not in the puddling, as the necessary modifications in the supply of cinder and the working of the damper are well understood, and have been sufficiently explained in the specifications of abandoned patents and otherwise. The secret part of this process is in the selection of the pig-iron, or rather of the "blend" of the pig-irons, for it is found that a mixture of certain brands of pig-iron is better than any single brand used alone.

My own experience in connection with this subject has been very interesting, and is, I think, worthy of record. When engaged as chemist in the works of Sir JOHN BROWN & Co., of Sheffield, I made careful analyses of all the numerous brands of pig-iron that are used for various purposes in these works. These I tabulated and kept continually before me, in order to compare their composition with the special uses to which they are applied, and the properties which they, or the material made from them, exhibited. The manager of the iron department was a remarkable example of one of those self-taught, unconscious philosophers I have above alluded to. He has, during many years, been observing, experimenting and generalising his inductions, consisting of a code of original rules for the manufacture of iron suitable for various purposes. Like the man who had talked prose all his life without knowing it, he has been following strictly the injunctions of "Novum Organon" in discovering the best "blends" of pig-iron for manufacturing respectively armor-plates, rails, boiler-plates, angle-irons, etc., etc.; and among his other mysteries were certain blends for making puddled steel. These he calls his "steel irons." He selected these, like all the others, without having, or pretending to have, any knowledge of their chemical composition.

By quite a different path, *i. e.*, upon purely theoretical chemical grounds, I had determined that certain brands among those I had analyzed were the best fitted for making puddled steel, and was anxious to verify my theory. To have asked directly for a revelation of the iron manager's secrets would have been unreasonable, and therefore I simply gave him a statement of the analyses of these particular brands, all arranged together, and called them "steel-irons," adding that for the best work I supposed he mixed with them a proportion of a certain foreign brand. "Hush, don't talk so loud; I don't want these fellows to hear you. Who told you that I use these?" was the substance of Mr. JEVON'S reply. My theoretical and his practical selections proved to be exactly the same in result. He had selected just those particular pigs which contained the smallest per centage of phosphorus, and which relatively to their carbon contained the smallest proportion of silicon.

But this was not all. I had just concluded a number of experiments made for the express purpose of determining the function of manganese in the manufacture of iron and steel, and had come to the conclusion that its usefulness depends upon its readily oxydizing, even before all the carbon is oxydized, and thereby affording a base with which the silica could unite and form a liquid and readily fusible silicate. Now this is just what is wanted in making puddled steel, and hence I suggested the addition of the highly manganiferous foreign ore. He had recently discovered that it did just what I expected, and supposed that his discovery was quite new. Such, however, was not the case, for this, like so many other trade mysteries, had been independently discovered by a number of other practical investigators.

The foreign manganiferous metal referred to is Spiegeleisen. Dr. PERCY says "Spiegeleisen has been found admirably suited for the production of puddled steel of the best quality, and accordingly it is largely used for this purpose." Now spiegeleisen is remarkably free from those impurities which, as I have stated, cannot be removed from common English pig-iron without also taking out the carbon. I find that the average proportion of silicon to carbon in English pigs is about three-fourths; in speigeleisen it is about one-fourth, and that the average proportion of phosphorus in the samples of spiegeleisen which I have analyzed, it is less than one-twentieth of the quantity contained in our Cleveland pigs. Three, four, and five-hundredths per cent. is the quantity I ordinarily find in good German or Swedish spiegeleisen. The sulphur seldom exceeds one-tenth per cent., and the large quantity of manganese materially assists in the removal of the silicon. It is, in fact, very similar to the Styrian cast-iron, which, as I have already stated, does not present the English difficulty of making steel by the direct process. Both are charcoal-irons, made from remarkably rich and pure ores. The manufacture of cast-iron from such ores, and steel from such cast-iron, is mere child's play compared with our native manufactures.

In reference to the second fact that the manufacture of puddled steel has been carried out more successfully on the Continent than in England, I need only say that this confirms my statements, as the puddlers there are less skilful than ours, and their raw material is a vastly superior charcoal iron, such as I have already described.

The third fact, namely, that only *mild* steel of inferior quality is made by this process, is further confirmation of what I have said respecting the necessity of removing the carbon from common pig-iron in order to purify it sufficiently to produce good steel; for even with all this skillful selection of the purest pigs, and the mixing of speigeleisen with them, it is found in this country impracticable to make puddled steel containing more than one-half per cent. of carbon. Such steel is only fit for rails, tires, for rubbish cutlery, and other purposes where a very soft steel, or rather steely iron is used. If the puddling were stopped when the carbon was only reduced to about 1.75, or say 1.5 per cent. (the quantity contained in the best hard cast-steel), the puddled steel would be utterly rotten, it would crush under the hammer whether hot or cold; the reason of this being that even with the best English pigs, the selected "steel-irons," there would, with this amount of carbon, still remain a ruinous proportion of silicon, phosphorus, etc. It is necessary with all available advantages to bring down the carbon to within one-half per cent. in order to produce a workable material. Even then it is worth only about one-third of the price of good cast-steel.

I might illustrate this subject still further by entering into the details of the chemistry of the Bessemer process and of Bessemer steel, by the history of the nitrate of soda process, and of other attempts to manufacture steel directly from cast-iron; but I think the above is sufficient to expose the fundamental fallacy upon which all such attempts have been founded. I hope to have succeeded more particularly in demonstrating the very great error of those who, in their attempts to make such steel, have, like the friend of my correspondent whose letter opens this paper, deliberately chosen cinder-pig or other inferior iron upon which to make their demonstrative experiments. This was the case with the Heaton Company. They worked for a long time at Langley Mill with one of the worst classes of pig-iron they could have selected for their purpose. I pointed this out to them in a letter printed in the *Chemical News* of February 19, 1869. This effort, the most promising of any of the kind, on account of the action of the residual alkaline soda, was, through this serious mistake, never fairly tested. I witnessed some of their experiments, and analyzed and otherwise tested the results. There can be little doubt that with properly selected pigs a material similar to puddled or Bessemer steel may be made by this process, and by several others that have been tried and have failed; but with the common English pig-irons, all such attemps to make steel by the partial oxidation of the carbon must of necessity fail, unless some entirely new, some hitherto unknown method of removing the silicon, phosphorus, and sulphur of the pig-iron is also used. In such a case, the novelty, the invention, the triumph, would consist not in the decarburization of the cast-iron, but in the separation of other ingredients.

I therefore recommend all inventors who seek to simplify or otherwise improve the manufacture of steel, to direct their attention first to the removal of phosphorus, next to the removal of silicon, thirdly to the removal of sulphur, and last and least of all to mere decarburization, for that is a problem of the utmost simplicity, and already sufficiently understood.

My next paper will be "On the Chemistry of the Bessemer Process," and will include some original observations, the results of which I believe to be of considerable value to the numerous manufacturers who are now erecting or working Bessemer plant.

MISCELLANEA.

Process for the Desulphurization of Coke.—The process for desulphurizing coke, to be used in the reduction of iron, was patented by MM. GRANDIDIER and RUE. It consists in heating the coke to 250-300 C., in a stream of air which is compressed to 2½ atmospheres. At this temperature the coke itself does not burn, while the sulphuret of iron is completely oxidized. Part of the sulphur goes off as sulphurous acid, part is converted into sulphuric acid, which combines, according to GRANDIDIER and RUE, first with oxide of iron and then with the argillaceous matter present. The coke, after this heating, is put into water, which dissolves out the sulphate of iron and part of the other sulphur salts. It is found that the sulphuric acid combined with clay is not given up to iron in the reduction furnace; hence its presence is not deleterious. RUE and GRANDIDIER claim that the action is not only chemical, but also mechanical, the molecules being compressed. By this process they say that the reducing power of the coke is increased. The authors then go on to estimate the cost of the apparatus under different conditions, and also to give the quantity of coke used as compared with the quantity of ordinary coke.—*Le Genie Industriel*, April, 1870.

Preparation of Ozygen by Baryta.—The property, possessed by baryta, of absorbing oxygen from the air when heated, has been utilized by M. GONDOLD for the economical preparation of the gas on a large scale. The process is based on the following: If baryta is heated to a dull red, oxygen is absorbed and the baryta is converted to its original form of protoxide. According to the *Journal de l'Eclairage au Gaz*, the apparatus employed by the inventor consists of a retort, into which he introduces a mixture of baryta and soda, potash, or manganese, whose presence, though useless in the reaction, is necessary to prevent the baryta from fritting. The retort is heated to dull redness, and a current of air is passed over the baryta which absorbs oxygen. When the absorption is complete, the current of air is interrupted and the temperature is raised, the oxygen being collected in a gas-holder. When the gas ceases coming off, the retort is allowed to cool to dull redness again, the current of air is turned on and the operation repeated. The material does not require renewal, the air alone furnishing the oxygen.

Amorphous Silica as a means of Fixing Pigments and Dyes.—Dr. M. REIMANN describes, at some length, a series of experiments made with the view to supply amorphous silica (as obtained by precipitating a solution of so-called water-glass, silicate of soda, or potassa, with an acid, and collecting, washing, and drying the precipitate in the ordinary way) for absorbing the solutions of fuchsine, aniline, blue, etc., and to apply the colored powder so prepared as a pigment for various materials. He states that glass, first superficially acted upon by hydrofluoric acid, and next mordanted, as is usual for cotton, assumes, when submitted to the process in use for dyeing fibre, precisely similar colors as that fibre, and that this effect is caused by the amorphous silica contained in the glass and made active by the hydrofluoric acid.

The Supply of India-Rubber.—A belt of land around the globe, 500 miles north and 500 miles south of the equator, abounds in trees producing the gum of India-rubber. They can be tapped, it is stated, for twenty successive seasons without injury; and the trees stand so close that one man can gather the sap of eighty in a day, each tree yielding, on an average, three tablespoonfuls daily. Forty-three thousand of these trees have been counted in a tract of country thirty miles long by eight wide. There are in America and Europe more than 150 manufactories of India-rubber articles, employing some 500 operatives each, and consuming more than 10,000,000 pounds of the gum per year.

Peruvian Bismuth.—A large proportion of the bismuth of commerce is manufactured in Saxony, and contains both arsenic and sulphur. From the recently discovered Peruvian deposits of bismuth compounds, there is now produced the metal free from both the substances named above as occurring in the Saxon bismuth. According to Barth, in *Dingler's Polytechnisches Journal*, the Peruvian product contains 4.57 per cent. of antimony (with a trace of tin) and 2.06 per cent. of copper (with a small amount of iron), the balance 93.37 per cent., being bismuth.

Suicide of Comstock.—A despatch from Helena, Montana, states that HENRY P. COMSTOCK, prospector and discoverer of the Comstock silver lode, Nevada, committed suicide on the 27th ultimo, near Bozeman City, Montana, by shooting himself through the head with a revolver. He had accompanied the Big Horn expedition to Bozeman. He is supposed to have been laboring under a temporary aberration of mind.

Utilization of Corn Husks.—In Austria the husks of corn are not only made into paper, but into clothing, and a good article of food is also produced from them. Paper clothing is also made in China and Japan, where a good coat can be had for ten cents, and a whole suit of clothing for a quarter of a dollar. In Germany paper-napkins are now introduced; the cost of them is a trifle.

The Price of Coal.—The representatives of the miners and of the coal operators in the Schuylkill region met in Pottsville, Pa., on the 27th ult., for the purpose of averaging the prices of coal for the month, and found, according to the sworn statements presented by the operators, the average price to be $2 44½, and that, therefore, the wages shall be reduced on a basis of 16½ per cent.

A Hint.—Reader, have you ever seen that splendid magazine, *The Manufacturer and Builder*? No! Then sit right down and write to Messrs. WESTERN & COMPANY, Publishers, 37 Park Row, New York, for a specimen copy. They charge you nothing for it, and you will receive a tenfold reward for your trouble by return mail.

Ancient Metal Mines.—The fall of a large mass of rock between Heidelberg and Weisloch, in Germany, has brought to light the works of a silver mine which was known to the ancient Romans. There is no silver ore of any importance left, but a very rich zinc ore is met with in large quantities.

Ore Shipments.—The Battle Mountain Mining Company shipped, September 28, fourteen tons of copper ore to Liverpool. On the same day the White Mining Company shipped five and a quarter tons of galena ore to San Francisco.

THE ENGINEERING AND MINING JOURNAL.

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ROSSITER W. RAYMOND, Ph. D., Editor.

PUBLISHERS' ANNOUNCEMENT.

THE ENGINEERING AND MINING JOURNAL *is projected in the intent of furthering the best interests of the Engineering and Mining public, by giving wide circulation to original special contributions from the pens of the ablest men in the professions. The careful illustration of new machinery and engineering structures, together with a summary of mining news and market reports, will form a prominent feature of the publication.*

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The Progress of Colorado.

OUR Colorado friends are highly elated, and with excellent reason, over the display of the mineral and agricultural wealth of the Territory, made at the fair of the Colorado Agricultural and Industrial Association, which took place at Denver in the last week of September. It is nothing new to hear the tones of sturdy self-assertion from Colorado. Her people have always understood the maxim "Think well of yourself, and others will think well of you." But it gives us honest pleasure to admit, that their boasting was never so moderate, and their grounds for it were never so ample and satisfactory, as now. We do not hear quite so much of the mines "paying the National Debt"; but we see an industrious community, paying its own debts, and having something to spare for the maintenance of good government and internal improvements.

The recent fair at Denver was inferior in its array of native stock to that of last year, and no more than equal to its predecessor in point of agricultural products. But these facts have little significance. What Colorado can do in these particulars is well known already; and it matters not whether the heifers or the turnips are a few inches larger round the belly this year or last. On the other hand, the magnificent display of blooded stock just concluded means a great deal. It shows growing wealth and intelligence among stock-raisers, and promises still better things hereafter.

We give considerable space in our columns to extracts from the reports of the Colorado papers, and especially from the address of Governor McCOOK. From these it will appear what enormous results are actually obtained in agriculture from the soil of the Territory. The crops this year have suffered greatly from drought, so that, although the area under cultivation is greater, the total harvest will probably not exceed that of 1869. But next season will astonish the outside world; and meanwhile, though the average yield given by the Governor will not be realized in the present crop, the ranchmen of Colorado may claim with truth that, even under the great disadvantage of a partial failure, they have far exceeded the general average of the United States.

But the great glory of the fair was its display of ores and bullion. The total value of the samples on exhibition was not far from $100,000; and the exhibition as a whole has seldom or never been equalled. We leave the figures, elsewhere quoted, to tell their own story. An impressive story it is; and now that two railroads have made it easy to visit Denver, there will be crowds of visitors from Chicago, St. Louis, and cities further East, to gaze upon the sources of so much treasure. The pride and joy of the citizens over this splendid testimony to their young industry is more than pardonable; it is fully justified. They have no longer any need to indulge in idle asseverations; they can point to facts.

It is because we heartily sympathize with this legitimate feeling, that we are more than ever opposed to any trace of that empty boasting, which was always ridiculous and is now unnecessary. If we might venture to borrow an illustration from a pastime not unknown in the West, we would remind Governor McCOOK that a man who holds three kings needn't "bluff." Three kings will do; but the Governor must needs lay claim to four aces. He says: "I have never heard any man doubt the fact that the area of the mines of Colorado is greater, and the average value of their ores richer, than any others on the American continent."

We do not select this passage for criticism out of a generally excellent and sensible address, because it is exaggerated, but because it is mischievous. The area of the Colorado mines, if by that phrase is meant the area of the actual groups of productive lodes, is relatively small, though large enough to sustain an immense mining industry. But the Governor's statement on this point will do no particular harm; and the progress of discoveries may make it true. It is the allusion to the average value of the ores which is likely to do harm. A great trouble in Colorado from the beginning has been the habitual though often innocent exaggeration of the "average value" of ores. People do not seem to know what this phrase means. At first it used to mean the average result of a large number of sample-assays; then, when we had grown wiser, it meant the average of pulp-assays taken in the mills; and beyond the latter signification we have apparently not yet advanced.

Now any district can maintain a high "average value" of this sort, as long as it sends only good ores to the mill or furnace; and the figures signify, *not* the average value of all the ore in the veins, not even that of the ore extracted, but that of the ore treated. In other words, they are a criterion of the expense of mining and reduction—and that is all. Moreover, since no mines ever did or do contain rich ores only, the high yields are generally associated with wasteful sorting, which still further increases the expense of mining.

Let any man who would apply this test to a mine or a district measure the excavations on the lodes, calculate the whole amount of vein-matter removed, and compare this with the total of bullion produced. In Colorado this style of calculation would produce some surprising results. But Colorado is no worse and no better than any other districts in this respect. She is just now working her best mines, and of these only the best and second-best ones. When, in the progress of healthful industry, more mines shall be opened, existing mines operated on a larger scale and more permanent system, and less ore thrown away or left standing as too poor to work, we shall see an apparent decrease in the value per ton of the contents of her veins; and we cannot wish her better fortune than just this decrease. Governor McCOOK seems to recognize this principle when he prophecies the working of ores which have heretofore been considered too poor to pay expenses; and he will doubtless rejoice with us, when he sees the "average value" of Colorado ores steadily decrease, and their actual product steadily advance. The "science" now needed is a good old domestic science known as economy; the "process of reduction" should be the reduction of expenses as well as sulphurets. It will not be long before the Governor can appeal to facts more substantial than "area" and "average value."

Rivers vs. Railroads.

THERE is a good deal of complaint in the country, of the interference of railroad bridges with river navigation; and we confess that it seems to us, in the main, well-founded. Navigable rivers are natural public highways. They afford cheaper transportation than railroads, and they give every man a chance to travel with his own goods in his own vessel. Railroads, on the other hand, however useful to the public, are private property, and they are operated in the interest of their owners, who serve the people just so far as it pays them, and no further, unless they are forced by law to do it. There is no danger of monopoly in rivers; there is great danger of monopoly in railroads. One of the most serious perils foreseen by thoughtful men to be threatening our political system, is the growth and consolidation of these vast and wealthy corporations, and their manipulations of legislatures in order to secure to themselves advantages which nature or free competition would not give them.

Perhaps no State has greater reason for alarm in this direction than Pennsylvania. The evil is mitigated in New York by the sharp rivalry between two great lines of railway, the Erie and the Central; but in our sister State a single powerful corporation controls the business from East to West, and is popularly supposed to control politics also.

A recent meeting at Pittsburgh, of parties interested in the river traffic, especially the transportation of coal, has revealed the extent to which that important business is interfered with by the construction of bridges for railroads. It is estimated that the loss already incurred from this cause by the coal shippers amounts to several hundred thousand dollars; and a bridge now building threatens to inflict still greater damage. The complaint is, that the spans are both too narrow and too low, rendering the passage of barges in fleets and at high water dangerous or impossible. It is proposed to appeal both to the State Legislature and to the general Government; and we trust that in some way the impending danger may be remedied.

Certainly the interests of a city like Pittsburgh are worthy of consideration; and still more important are the interests of the West and South, which use the Pittsburgh coal. Cheap fuel is one of the vital necessities of successful and varied industry; and the injury to innumerable interests from a rise of two or three cents a bushel in the price of coal, (which, it is said, will be the result of the increased difficulty and risk of navigation,) can scarcely be calculated. Instead of allowing the Allegheny and the Ohio to be still further obstructed, the Government should take more vigorous measures to improve them as necessary highways of commerce. The nine railways which centre at Pittsburgh would not compensate her for the loss of her river. We have seen enough in Eastern Pennsylvania of chartered monopolies fixing, or rather, perpetually unfixing, the price of coal; and we trust that the curse will not become universal.

New Publications.

GILLESPIE'S HIGHER SURVEYING. Published by D. APPLETON & Co.

In the publication of this book, not only has a promise of long standing been redeemed, but another valuable memento of the lamented GILLESPIE has been added to those which scientific literatature already possesses.

In a posthumous publication an editor's name necessarily appears. In this case it is, very appropriately, that of Professor GILLESPIE'S successor at Union College—Professor CALEB STALEY, C. E.

The work is separated into eight parts—

I. *Direct Leveling.*
II. *Indirect Leveling.*
III. *Barometric Leveling.*
IV. *Topography.*
V. *Mine Surveying.*
VI. *Surveying with the Sextant, etc.*
VII. *Maritime Surveying.*
VIII. *Spherical Surveying.*

The matter in each of these parts, as well as the method of its presentation, fits the book admirably for use in colleges and technical schools. The description of operations, particularly in leveling, is very minute and faithful to the incidents of practice. Young men, in or out of school, who are studying the field work of engineering, will find this volume a very important addition to the earlier ones of the same author, and, therefore, invaluable in aiding them, so far as books can, in acquiring the surveyor's art.

The Great Northern Telegraph.

By WILLIAM HOOPER.

On the Expedition of the Great Northern Telegraph, China and Japan Extension Company.*

THE submarine telegraph cable, which is now being laid between Hong-Kong and Poisette Bay, may be regarded as an important link in the chain of electrical communication, tending as it does to bring us in connection with the most distant parts of the British possessions. On this account I consider that a brief notice of the incidents connected with this expedition may be of interest to the section, and in bringing this matter before you I propose to deal with the subject in its electrical and mechanical bearing, and also so far statistically as the subject will permit.

Several schemes have from time to time been proposed for the purpose of connecting Europe telegraphically with China, but the route which in every way offered the soundest commercial advantages is that known as "The China and Japan Extension of the Great Northern Telegraph Company," for, in addition to the shortness of its proposed submarine circuits, there exists a complete system of overland communication with England through Russia. These land lines are at the disposal of the company, the Russian Government having undertaken to connect them with the landing point of the cable, and at all times to have a sufficient number of wires available for the traffic.

The cable at present to be laid by this company has a total length of 2296 nautical miles, in two sections of 1098 and 1198 nautical miles respectively. The first section is to be laid from Hong-Kong to Wladiwastok (Shanghai). These two parts, which may be looked upon as the centre of European intercourse with China, and in which, consequently, large European trading interests are concerned, will be rendered still more important and attractive from the prospects of that commercial and social development which the electric telegraph invariably effects between trading and social communities. Four descriptions of cable have been made, namely:

Main or deep-sea,	A,	weighing 1¼	tons per	nautical mile.
Shallow water cable,	B,	" 3	"	"
Intermediate shore,	C,	" 8	"	"
Heavy shore end,	D,	" 18	"	"

The cables have been supplied by Hooper's Telegraph Works, Limited, the core being manufactured at the works of the company, at Mitcham, and sheathed at the works of Messrs. SIEMENS BROTHERS. The core in each cable consists of a strand conductor weighing 300 pounds per nautical miles, insulated with 200 pounds of Hooper's patent india-rubber insulator, giving a diameter of 32 inches.†

According to the contract specification for the core, the specific conductivity of the copper was fixed at 90 per cent. of pure copper, whilst the dielectric resistance per nautical mile at 75° Fahr. was to be not less than 3,500 miles B.A. units; the capacity was not to exceed .4402 Farads per nautical mile. The actual specific conductivity has reached over 94 per cent. that of pure copper, and the dielectric resistance per nautical mile is about 4,500 million B.A. units at 75° Fahr., the capacity being slightly under .44 Farads. The electrical measurements are made in the usual way, and the joints tested by the accumulation method of Mr. LATIMER CLARK. It has long been known that, in consequence of the lower specific inductive capacity of HOOPER'S patent india-rubber insulator, as compared with gutta-percha, a core may be constructed offering the same electrical advantages as a gutta-percha core, at a much less cost; and the several lines from Denmark to England, Norway to Scotland, and in the Baltic, having fully realized the anticipation contemplated, induced the Great Northern Telegraph Company to give the preference to HOOPER'S core for these longer circuits.

The experience in making this longer length of cable has shown that not only can the full advantage be taken in reducing the amount of cost proportionally to the reduced amount of insulation, but that such a core is electrically and mechanically safe for the subsequent operations of sheathing, requiring no more care than is usually involved, whilst the bulk of cables thus constructed may be so reduced as to become a matter of further importance as regards freightage, and causing thereby a very considerable reduction in the cost of submarine telegraph cables. Sir WILLIAM THOMPSON has shown that if long cables could be constructed of gutta-percha, containing a "core" not exceeding 2.72 times in diameter that of the conductor, the highest attainable speed would be met with, but in practice it

* Communicated to the British Association.

† This core contains the heaviest conductor in proportion to the insulation that has ever been made.

Papers on Iron and Steel.

By W. MATTIEU WILLIAMS.

II.

A VERY COSTLY AND VEXATIOUS FALLACY.

THE greatest enemy to steel is phosphorus; one-tenth per cent. is sufficient to produce serious deterioration, and even to render the harder varieties of steel utterly worthless. As our common English pig iron is made from clay iron stones, many of the nodules of which contain, as nuclei or otherwise, the remains of fishes and other animal matter, they are exceptionally rich in phosphorus; and thus all the difficulties of steel-making are greatly increased in this country. There are few results in connection with the progress of British industry of which we have better reason to be proud than our pre-eminence as steel-makers, in spite of the greatest natural disadvantages; and this is the more remarkable from the fact that so great a triumph has been gained by illiterate men, who have achieved it by following out with a remarkably sound though unaided sagacity the strict method of true Baconian investigation. Whenever I meet a formulating, book-stuffed pedant, I love to tell him of the great unconsidered fact, that while the learned men of the middle ages were muddling their intellects with worthless disputations, the artisans of that period were true inductive philosophers, and that the revival of science only commenced when the men of the universities adopted the method which had always been followed by the men of the workshop.

If the men of the universities have outstripped the men of the workshop in recent times, it is simply due to the fact that science has kept systematic record of its achievements, by means of which each worker has the full benefit of the labors of his predecessors and fellow-workers, and it is able to start from the point where these left off; whereas the workshop observers and experimentalists have worked with little or no systematic co-operation. If such co-operation only among one set of investigators has done so much, what may we not expect when it shall not only be extended to the other, but when both sections shall co-operate with each other. This technical and scientific co-operation is the great want of the present age. The artisan needs scientific education, and the professors of science have much to learn from the great mass of facts included in the practical experience of the workshop.

But I must not at present be carried further away into this tempting digression, but return to my main subject by anticipating an objection which will probably be made. The manufacture of puddled steel may be supposed to refute all I have said regarding the impracticability of producing steel directly from English pig iron. If steel fit for the manufacture of files, chisels, etc., could be made from ordinary English pig iron by this process, all my statements certainly would be refuted, for puddled steel is simply made by checking the oxidation, and arresting it at such a point that some of the carbon in the pig iron shall remain unburnt.

The facts connected with the manufacture of puddled steel, which bear upon the present subject, are as follows: First, puddled steel of merchantable quality cannot be made at all from *common* English pig iron. Second, the manufacture of puddled steel has been much more successful on the continent than in England. Third, only *mild* steel, and that of an inferior quality, is made by this process from English iron.

Referring to the first fact, I may mention there is a great deal of mystery, and there have been a great many failures and much waste of labor, fuel and iron in carrying out this process in England. In many forges where it has been tried it is now altogether abandoned, and where it is carried on with any degree of success there is usually much secrecy maintained. Now, the mystery is not in the puddling, as the necessary modifications in the supply of cinder and the working of the damper are well understood, and have been sufficiently explained in the specifications of abandoned patents and otherwise. The secret part of this process is in the selection of the pig-iron, or rather of the "blend" of the pig-irons, for it is found that a mixture of certain brands of pig-iron is better than any single brand used alone.

My own experience in connection with this subject has been very interesting, and is, I think, worthy of record. When engaged as chemist in the works of Sir JOHN BROWN & Co., of Sheffield, I made careful analyses of all the numerous brands of pig-iron that are used for various purposes in these works. These I tabulated and kept continually before me, in order to compare their composition with the special uses to which they are applied, and the properties which they, or the material made from them, exhibited. The manager of the iron department was a remarkable example of one of those self-taught, unconscious philosophers I have above alluded to. He has, during many years, been observing, experimenting and generalising his inductions, consisting of a code of original rules for the manufacture of iron suitable for various purposes. Like the man who had talked prose all his life without knowing it, he has been following strictly the injunctions of "Novum Organon" in discovering the best "blends" of pig-iron for manufacturing respectively armor-plates, rails, boiler-plates, angle-irons, etc., etc.; and among his other mysteries were certain blends for making puddled steel. These he calls his "steel irons." He selected these, like all the others, without having, or pretending to have, any knowledge of their chemical composition.

By quite a different path, i. e., upon purely theoretical chemical grounds, I had determined that certain brands among those I had analyzed were the best fitted for making puddled steel, and was anxious to verify my theory. To have asked directly for a revelation of the iron manager's secrets would have been unreasonable, and therefore I simply gave him a statement of the analyses of these particular brands, all arranged together, and called them "steel-irons," adding that for the best work I supposed he mixed with them a proportion of a certain foreign brand. "Hush, don't talk so loud; I don't want these fellows to hear you. Who told you that I use these?" was the substance of Mr. JEVON'S reply. My theoretical and his practical selections proved to be exactly the same in result. He had selected just those particular pigs which contained the smallest per centage of phosphorus, and which relatively to their carbon contained the smallest proportion of silicon.

But this was not all. I had just concluded a number of experiments made for the express purpose of determining the function of manganese in the manufacture of iron and steel, and had come to the conclusion that its usefulness depends upon its readily oxydizing, even before all the carbon is oxydized, and thereby affording a base with which the silica could unite and form a liquid and readily fusible silicate. Now this is just what is wanted in making puddled steel, and hence I suggested the addition of the highly manganiferous foreign ore. He had recently discovered that it did just what I expected, and supposed that his discovery was quite new. Such, however, was not the case, for this, like so many other trade mysteries, had been independently discovered by a number of other practical investigators.

The foreign manganiferous metal referred to is Spiegeleisen. Dr. PERCY says "Spiegeleisen has been found admirably suited for the production of puddled steel of the best quality, and accordingly it is largely used for this purpose." Now spiegeleisen is remarkably free from those impurities which, as I have stated, cannot be removed from common English pig-iron without also taking out the carbon. I find that the average proportion of silicon to carbon in English pigs is about three-fourths; in speigeleisen it is about one-fourth, and that the average proportion of phosphorus in the samples of spiegeleisen which I have analyzed, it is less than one-twentieth of the quantity contained in our Cleveland pigs. Three, four, and five-hundredths per cent. is the quantity I ordinarily find in good German or Swedish spiegeleisen. The sulphur seldom exceeds one-tenth per cent., and the large quantity of manganese materially assists in the removal of the silicon. It is, in fact, very similar to the Styrian cast-iron, which, as I have already stated, does not present the English difficulty of making steel by the direct process. Both are charcoal-irons, made from remarkably rich and pure ores. The manufacture of cast-iron from such ores, and steel from such cast-iron, is mere child's play compared with our native manufactures.

In reference to the second fact that the manufacture of puddled steel has been carried out more successfully on the Continent than in England, I need only say that this confirms my statements, as the puddlers there are less skilful than ours, and their raw material is a vastly superior charcoal iron, such as I have already described.

The third fact, namely, that only *mild* steel of inferior quality is made by this process, is further confirmation of what I have said respecting the necessity of removing the carbon from common pig-iron in order to purify it sufficiently to produce good steel; for even with all this skillful selection of the purest pigs, and the mixing of speigeleisen with them, it is found in this country impracticable to make puddled steel containing more than one-half per cent. of carbon. Such steel is only fit for rails, tires, for rubbish cutlery, and other purposes where a very soft steel, or rather steely iron is used. If the puddling were stopped when the carbon was only reduced to about 1.75, or say 1.5 per cent. (the quantity contained in the best hard cast-steel), the puddled steel would be utterly rotten, it would crush under the hammer whether hot or cold; the reason of this being that even with the best English pigs, the selected "steel-irons," there would, with this amount of carbon, still remain a ruinous proportion of silicon, phosphorus, etc. It is necessary with all available advantages to bring down the carbon to within one-half per cent. in order to produce a workable material. Even then it is worth only about one-third of the price of good cast-steel.

I might illustrate this subject still further by entering into the details of the chemistry of the Bessemer process and of Bessemer steel, by the history of the nitrate of soda process, and of other attempts to manufacture steel directly from cast-iron; but I think the above is sufficient to expose the fundamental fallacy upon which all such attempts have been founded. I hope to have succeeded more particularly in demonstrating the very great error of those who, in their attempts to make such steel, have, like the friend of my correspondent whose letter opens this paper, deliberately chosen cinder-pig or other inferior iron upon which to make their demonstrative experiments. This was the case with the Heaton Company. They worked for a long time at Langley Mill with one of the worst classes of pig-iron they could have selected for their purpose. I pointed this out to them in a letter printed in the *Chemical News* of February 19, 1869. This effort, the most promising of any of the kind, on account of the action of the residual alkaline soda, was, through this serious mistake, never fairly tested. I witnessed some of their experiments, and analyzed and otherwise tested the results. There can be little doubt that with properly selected pigs a material similar to puddled or Bessemer steel may be made by this process, and by several others that have been tried and have failed; but with the common English pig-irons, all such attemps to make steel by the partial oxidation of the carbon must of necessity fail, unless some entirely new, some hitherto unknown method of removing the silicon, phosphorus, and sulphur of the pig-iron is also used. In such a case, the novelty, the invention, the triumph, would consist not in the decarburization of the cast-iron, but in the separation of other ingredients.

I therefore recommend all inventors who seek to simplify or otherwise improve the manufacture of steel, to direct their attention first to the removal of phosphorus, next to the removal of silicon, thirdly to the removal of sulphur, and last and least of all to mere decarburization, for that is a problem of the utmost simplicity, and already sufficiently understood.

My next paper will be "On the Chemistry of the Bessemer Process," and will include some original observations, the results of which I believe to be of considerable value to the numerous manufacturers who are now erecting or working Bessemer plant.

MISCELLANEA.

Process for the Desulphurization of Coke.—The process for desulphurizing coke, to be used in the reduction of iron, was patented by MM. GRANDIDIER and RUE. It consists in heating the coke to 250-300 C., in a stream of air which is compressed to 2½ atmospheres. At this temperature the coke itself does not burn, while the sulphuret of iron is completely oxidized. Part of the sulphur goes off as sulphurous acid, part is converted into sulphuric acid, which combines, according to GRANDIDIER and RUE, first with oxide of iron and then with the argillaceous matter present. The coke, after this heating, is put into water, which dissolves out the sulphate of iron and part of the other sulphur salts. It is found that the sulphuric acid combined with clay is not given up to iron in the reduction furnace; hence its presence is not deleterious. RUE and GRANDIDIER claim that the action is not only chemical, but also mechanical, the molecules being compressed. By this process they say that the reducing power of the coke is increased. The authors then go on to estimate the cost of the apparatus under different conditions, and also to give the quantity of coke used as compared with the quantity of ordinary coke.—*Le Genie Industriel*, April, 1870.

Preparation of Oxygen by Baryta.—The property, possessed by baryta, of absorbing oxygen from the air when heated, has been utilized by M. GONDOLD for the economical preparation of the gas on a large scale. The process is based on the following: If baryta is heated to a dull red, oxygen is absorbed and the baryta is converted to its original form of protoxide. According to the *Journal de l'Eclairage au Gaz*, the apparatus employed by the inventor consists of a retort, into which he introduces a mixture of baryta and soda, potash, or manganese, whose presence, though useless in the reaction, is necessary to prevent the baryta from fritting. The retort is heated to dull redness, and a current of air is passed over the baryta which absorbs oxygen. When the absorption is complete, the current of air is interrupted and the temperature is raised, the oxygen being collected in a gas-holder. When the gas ceases coming off, the retort is allowed to cool to dull redness again, the current of air is turned on and the operation repeated. The material does not require renewal, the air alone furnishing the oxygen.

Amorphous Silica as a means of Fixing Pigments and Dyes.—Dr. M. REIMANN describes, at some length, a series of experiments made with the view to supply amorphous silica (as obtained by precipitating a solution of so-called water-glass, silicate of soda, or potassa, with an acid, and collecting, washing, and drying the precipitate in the ordinary way) for absorbing the solutions of fuchsine, aniline, blue, etc., and to apply the colored powder so prepared as a pigment for various materials. He states that glass, first superficially acted upon by hydrofluoric acid, and next mordanted, as is usual for cotton, assumes, when submitted to the process in use for dyeing fibre, precisely similar colors as that fibre, and that this effect is caused by the amorphous silica contained in the glass and made active by the hydrofluoric acid.

The Supply of India-Rubber.—A belt of land around the globe, 500 miles north and 500 miles south of the equator, abounds in trees producing the gum of India-rubber. They can be tapped, it is stated, for twenty successive seasons without injury; and the trees stand so close that one man can gather the sap of eighty in a day, each tree yielding, on an average, three tablespoonsfuls daily. Forty-three thousand of these trees have been counted in a tract of country thirty miles long by eight wide. There are in America and Europe more than 150 manufactories of India-rubber articles, employing some 500 operatives each, and consuming more than 10,000,000 pounds of the gum per year.

Peruvian Bismuth.—A large proportion of the bismuth of commerce is manufactured in Saxony, and contains both arsenic and sulphur. From the recently discovered Peruvian deposits of bismuth compounds, there is now produced the metal free from both the substances named above as occurring in the Saxon bismuth. According to Barth, in *Dingler's Polytechnisches Journal*, the Peruvian product contains 4.57 per cent. of antimony (with a trace of tin) and 2.06 per cent. of copper (with a small amount of iron), the balance 93.37 per cent., being bismuth.

Suicide of Comstock.—A despatch from Helena, Montana, states that HENRY P. COMSTOCK, prospector and discoverer of the Comstock silver lode, Nevada, committed suicide on the 27th ultimo, near Bozeman City, Montana, by shooting himself through the head with a revolver. He had accompanied the Big Horn expedition to Bozeman. He is supposed to have been laboring under a temporary aberration of mind.

Utilization of Corn Husks.—In Austria the husks of corn are not only made into paper, but into clothing, and a good article of food is also produced from them. Paper clothing is also made in China and Japan, where a good coat can be had for ten cents, and a whole suit of clothing for a quarter of a dollar. In Germany paper-napkins are now introduced; the cost of them is a trifle.

The Price of Coal.—The representatives of the miners and of the coal operators in the Schuylkill region met in Pottsville, Pa., on the 27th ult., for the purpose of averaging the prices of coal for the month, and found, according to the sworn statements presented by the operators, the average price to be $2 44¼, and that, therefore, the wages shall be reduced on a basis of 16½ per cent.

A Hint.—Reader, have you ever seen that splendid magazine, *The Manufacturer and Builder*? No! Then sit right down and write to Messrs. WESTERN & COMPANY, Publishers, 37 Park Row, New York, for a specimen copy. They charge you nothing for it, and you will receive a tenfold reward for your trouble by return mail.

Ancient Metal Mines.—The fall of a large mass of rock between Heidelberg and Weisloch, in Germany, has brought to light the works of a silver mine which was known to the ancient Romans. There is no silver ore of any importance left, but a very rich zinc ore is met with in large quantities.

Ore Shipments.—The Battle Mountain Mining Company shipped, September 28, fourteen tons of copper ore to Liverpool. On the same day the White Mining Company shipped five and a quarter tons of galena ore to San Francisco.

THE ENGINEERING AND MINING JOURNAL.

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ROSSITER W. RAYMOND, Ph. D., Editor.

PUBLISHERS' ANNOUNCEMENT.

THE ENGINEERING AND MINING JOURNAL *is projected in the intent of furthering the best interests of the Engineering and Mining public, by giving wide circulation to original special contributions from the pens of the ablest men in the professions. The careful illustration of new machinery and engineering structures, together with a summary of mining news and market reports, will form a prominent feature of the publication.*

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The Progress of Colorado.

OUR Colorado friends are highly elated, and with excellent reason, over the display of the mineral and agricultural wealth of the Territory, made at the fair of the Colorado Agricultural and Industrial Association, which took place at Denver in the last week of September. It is nothing new to hear the tones of sturdy self-assertion from Colorado. Her people have always understood the maxim "Think well of yourself, and others will think well of you." But it gives us honest pleasure to admit, that their boasting was never so moderate, and their grounds for it were never so ample and satisfactory, as now. We do not hear quite so much of the mines "paying the National Debt"; but we see an industrious community, paying its own debts, and having something to spare for the maintenance of good government and internal improvements.

The recent fair at Denver was inferior in its array of native stock to that of last year, and no more than equal to its predecessor in point of agricultural products. But these facts have little significance. What Colorado can do in these particulars is well known already; and it matters not whether the heifers or the turnips are a few inches larger round the belly this year or last. On the other hand, the magnificent display of blooded stock just concluded means a great deal. It shows growing wealth and intelligence among stock-raisers, and promises still better things hereafter.

We give considerable space in our columns to extracts from the reports of the Colorado papers, and especially from the address of Governor McCOOK. From these it will appear what enormous results are actually obtained in agriculture from the soil of the Territory. The crops this year have suffered greatly from drought, so that, although the area under cultivation is greater, the total harvest will probably not exceed that of 1869. But next season will astonish the outside world; and meanwhile, though the average yield given by the Governor will not be realized in the present crop, the ranchmen of Colorado may claim with truth that, even under the great disadvantage of a partial failure, they have far exceeded the general average of the United States.

But the great glory of the fair was its display of ores and bullion. The total value of the samples on exhibition was not far from $100,000; and the exhibition as a whole has seldom or never been equalled. We leave the figures, elsewhere quoted, to tell their own story. An impressive story it is; and now that two railroads have made it easy to visit Denver, there will be crowds of visitors from Chicago, St. Louis, and cities further East, to gaze upon the sources of so much treasure. The pride and joy of the citizens over this splendid testimony to their young industry is more than pardonable; it is fully justified. They have no longer any need to indulge in idle asseverations; they can point to facts.

It is because we heartily sympathize with this legitimate feeling, that we are more than ever opposed to any trace of that empty boasting, which was always ridiculous and is now unnecessary. If we might venture to borrow an illustration from a pastime not unknown in the West, we would remind Governor McCOOK that a man who holds three kings needn't "bluff." Three kings will do; but the Governor must needs lay claim to four aces. He says: "I have never heard any man doubt the fact that the area of the mines of Colorado is greater, and the average value of their ores richer, than any others on the American continent."

We do not select this passage for criticism out of a generally excellent and sensible address, because it is exaggerated, but because it is mischievous. The area of the Colorado mines, if by that phrase is meant the area of the actual groups of productive lodes, is relatively small, though large enough to sustain an immense mining industry. But the Governor's statement on this point will do no particular harm; and the progress of discoveries may make it true. It is the allusion to the average value of the ores which is likely to do harm. A great trouble in Colorado from the beginniug has been the habitual though often innocent exaggeration of the "average value" of ores. People do not seem to know what this phrase means. At first it used to mean the average result of a large number of sample-assays; then, when we had grown wiser, it meant the average of pulp-assays taken in the mills; and beyond the latter signification we have apparently not yet advanced.

Now any district can maintain a high "average value" of this sort, as long as it sends only good ores to the mill or furnace; and the figures signify, *not* the average value of all the ore in the veins, not even that of the ore extracted, but that of the ore treated. In other words, they are a criterion of the expense of mining and reduction—and that is all. Moreover, since no mines ever did or do contain rich ores only, the high yields are generally associated with wasteful sorting, which still further increases the expense of mining.

Let any man who would apply this test to a mine or a district measure the excavations on the lodes, calculate the whole amount of vein-matter removed, and compare this with the total of bullion produced. In Colorado this style of calculation would produce some surprising results. But Colorado is no worse and no better than any other districts in this respect. She is just now working her best mines, and of these only the best and second-best ones. When, in the progress of healthful industry, more mines shall be opened, existing mines operated on a larger scale and more permanent system, and less ore thrown away or left standing as too poor to work, we shall see an apparent decrease in the value per ton of the contents of her veins; and we cannot wish her better fortune than just this decrease. Governor McCOOK seems to recognize this principle when he prophecies the working of ores which have heretofore been considered too poor to pay expenses; and he will doubtless rejoice with us, when he sees the "average value" of Colorado ores steadily decrease, and their actual product steadily advance. The "science" now needed is a good old domestic science known as economy; the "process of reduction" should be the reduction of expenses as well as sulphurets. It will not be long before the Governor can appeal to facts more substantial than "area" and "average value."

Rivers vs. Railroads.

THERE is a good deal of complaint in the country, of the interference of railroad bridges with river navigation; and we confess that it seems to us, in the main, well-founded. Navigable rivers are natural public highways. They afford cheaper transportation than railroads, and they give every man a chance to travel with his own goods in his own vessel. Railroads, on the other hand, however useful to the public, are private property, and they are operated in the interest of their owners, who serve the people just so far as it pays them, and no further, unless they are forced by law to do it. There is no danger of monopoly in rivers; there is great danger of monopoly in railroads. One of the most serious perils foreseen by thoughtful men to be threatening our political system, is the growth and consolidation of these vast and wealthy corporations, and their manipulations of legislatures in order to secure to themselves advantages which nature or free competition would not give them.

Perhaps no State has greater reason for alarm in this direction than Pennsylvania. The evil is mitigated in New York by the sharp rivalry between two great lines of railway, the Erie and the Central; but in our sister State a single powerful corporation controls the business from East to West, and is popularly supposed to control politics also.

A recent meeting at Pittsburgh, of parties interested in the river traffic, especially the transportation of coal, has revealed the extent to which that important business is interfered with by the construction of bridges for railroads. It is estimated that the loss already incurred from this cause by the coal shippers amounts to several hundred thousand dollars; and a bridge now building threatens to inflict still greater damage. The complaint is, that the spans are both too narrow and too low, rendering the passage of barges in fleets and at high water dangerous or impossible. It is proposed to appeal both to the State Legislature and to the general Government; and we trust that in some way the impending danger may be remedied.

Certainly the interests of a city like Pittsburgh are worthy of consideration; and still more important are the interests of the West and South, which use the Pittsburgh coal. Cheap fuel is one of the vital necessities of successful and varied industry; and the injury to innumerable interests from a rise of two or three cents a bushel in the price of coal, (which, it is said, will be the result of the increased difficulty and risk of navigation,) can scarcely be calculated. Instead of allowing the Allegheny and the Ohio to be still further obstructed, the Government should take more vigorous measures to improve them as necessary highways of commerce. The nine railways which centre at Pittsburgh would not compensate her for the loss of her river. We have seen enough in Eastern Pennsylvania of chartered monopolies fixing, or rather, perpetually unfixing, the price of cool; and we trust that the curse will not become universal.

New Publications.

GILLESPIE'S HIGHER SURVEYING. Published by D. APPLETON & Co.

In the publication of this book, not only has a promise of long standing been redeemed, but another valuable memento of the lamented GILLESPIE has been added to those which scientific literatature already possesses.

In a posthumous publication an editor's name necessarily appears. In this case it is, very appropriately, that of Professor GILLESPIE's successor at Union College—Professor CALEB STALEY, C. E.

The work is separated into eight parts—

I. *Direct Leveling.*
II. *Indirect Leveling.*
III. *Barometric Leveling.*
IV. *Topography.*
V. *Mine Surveying.*
VI. *Surveying with the Sextant, etc.*
VII. *Maritime Surveying.*
VIII. *Spherical Surveying.*

The matter in each of these parts, as well as the method of its presentation, fits the book admirably for use in colleges and technical schools. The description of operations, particularly in leveling, is very minute and faithful to the incidents of practice. Young men, in or out of school, who are studying the field work of engineering, will find this volume a very important addition to the earlier ones of the same author, and, therefore, invaluable in aiding them, so far as books can, in acquiring the surveyor's art.

The Great Northern Telegraph.

By WILLIAM HOOPER.

On the Expedition of the Great Northern Telegraph, China and Japan Extension Company.*

THE submarine telegraph cable, which is now being laid between Hong-Kong and Poisette Bay, may be regarded as an important link in the chain of electrical communication, tending as it does to bring us in connection with the most distant parts of the British possessions. On this account I consider that a brief notice of the incidents connected with this expedition may be of interest to the section, and in bringing this matter before you I propose to deal with the subject in its electrical and mechanical bearing, and also so far statistically as the subject will permit.

Several schemes have from time to time been proposed for the purpose of connecting Europe telegraphically with China, but the route which in every way offered the soundest commercial advantages is that known as "The China and Japan Extension of the Great Northern Telegraph Company," for, in addition to the shortness of its proposed submarine circuits, there exists a complete system of overland communication with England through Russia. These land lines are at the disposal of the company, the Russian Government having undertaken to connect them with the landing point of the cable, and at all times to have a sufficient number of wires available for the traffic.

The cable at present to be laid by this company has a total length of 2296 nautical miles, in two sections of 1098 and 1198 nautical miles respectively. The first section is to be laid from Hong-Kong to Wladiwastok (Shanghai). These two parts, which may be looked upon as the centre of European intercourse with China, and in which, consequently, large European trading interests are concerned, will be rendered still more important and attractive from the prospects of that commercial and social development which the electric telegraph invariably effects between trading and social communities. Four descriptions of cable have been made, namely:

Main or deep-sea,	A,	weighing	1¼	tons per nautical mile.
Shallow water cable,	B,	"	3	" "
Intermediate shore,	C,	"	8	" "
Heavy shore end,	D,	"	18	" "

The cables have been supplied by Hooper's Telegraph Works, Limited, the core being manufactured at the works of the company, at Mitcham, and sheathed at the works of Messrs. SIEMENS BROTHERS. The core in each cable consists of a strand conductor weighing 300 pounds per nautical miles, insulated with 200 pounds of Hooper's patent india-rubber insulator, giving a diameter of 32 inches.†

According to the contract specification for the core, the specific conductivity of the copper was fixed at 90 per cent. of pure copper, whilst the dielectric resistance per nautical mile at 75° Fahr. was to be not less than 3,500 miles B.A. units; the capacity was not to exceed .4402 Farads per nautical mile. The actual specific conductivity has reached over 94 per cent. that of pure copper, and the dielectric resistance per nautical mile is about 4,500 million B.A. units at 75° Fahr., the capacity being slightly under .44 Farads. The electrical measurements are made in the usual way, and the joints tested by the accumulation method of Mr. LATIMER CLARK. It has long been known that, in consequence of the lower specific inductive capacity of HOOPER's patent india-rubber insulator, as compared with gutta-percha, a core may be constructed offering the same electrical advantages as a gutta-percha core, at a much less cost; and the several lines from Denmark to England, Norway to Scotland, and in the Baltic, having fully realized the anticipation contemplated, induced the Great Northern Telegraph Company to give the preference to HOOPER's core for these longer circuits.

The experience in making this longer length of cable has shown that not only can the full advantage be taken in reducing the amount of cost proportionally to the reduced amount of insulation, but that such a core is electrically and mechanically safe for the subsequent operations of sheathing, requiring no more care than is usually involved, whilst the bulk of cables thus constructed may be so reduced as to become a matter of further importance as regards freightage, and causing thereby a very considerable reduction in the cost of submarine telegraph cables. Sir WILLIAM THOMPSON has shown that if long cables could be constructed of gutta-percha, containing a "core" not exceeding 2.72 times in diameter that of the conductér, the highest attainable speed would be met with, but in practice it

* Communicated to the British Association.

† This core contains the heaviest conductor in proportion to the insulation that has ever been made.

has been found that the thickness of such a coat of gutta-percha could not be depended on. The proportion has consequently been increased as a provision for security; thus, by increasing the weight of gutta-percha, a positive disadvantage arises as regards the rate of signalling. The great mechanical endurance of HOOPER'S insulator, and its high electrical properties, meet the desired requirements, and the core of this cable has been constructed so as to assimilate that proportion which Sir WILLIAM THOMPSON has theoretically shown to be adapted for giving the highest possible speed.

The saving which may be effected by these proportions is in ordinary cables, rather more than one-half the bulk of the insulator. Thus the credit of having practically applied a great principle of economy, as well as acknowledging our obligation to science on this important point, belongs to the scientific advisers of the Great Northern Telegraph Company of Copenhagen.

The external covering in each of these cables is in principle the same, the only difference being in the size and number of the iron wires. The core is first covered with two layers of jute yarn laid on in opposite directions, and coiled into tanks containing a preservative compound, which serves at the same time, by surrounding the core with a conducting substance, to render any defect arising in this part of the operation of sheathing immediately visible, thus preventing its passing into the cable. The iron wires are laid on in the usual way, and the cable so manufactured is coated with a hot mixture of asphalte and silica, over which are laid in opposite directions two servings of jute yarn, with another coating of asphalte, etc., between them, and finally a coating of compound is applied to the exterior of the hemp covering.

The main or deep sea portion contains seventeen galvanized iron wires of the quality known as best best, each having a diameter .095 in., or No. 13 on the Birmingham wire gauge. The shore end contains ten best best galvanized iron wires, .38 inches diametes or 00 on the Birmingham wire gauge; and then the covering of hemp and compound. The length of each of these cables to be manufactured are, for the Hong Kong to Shanghai section:

		Nautical miles.
Main cable	A	685
Intermediate	B	272
Shore end	C	111
Heavy do	D	30
Total		1098

and for the Shanghai to Posette section:

	Nautical miles.
Main cable	990
Intermediate	92
Shore end	96
Heavy do	20

In the application of the external covering of the cable, and during shipment, nothing occurred to merit special reference. This section was taken out in two ordinary steamers, and the Danish frigate "Tordenskjold." The Danish frigate "Tordenskjold" is also to serve as a convoy to the expedition, and to assist in completing the soundings. It may be worth stating that the cable shipped in the frigate was not coiled in water-tanks, but shipped dry, it not being necessary to keep the cable under water, as the heat to which the core would be subjected to in transit, will not produce any mechanical or electrical derangement in its condition. In this respect, "Hooper's core" has also a great advantage over a gutta-percha core. This leads to an important conclusion, when considering the freightage of cables to long distances. All the three ships with the cable—for the first section on board having passed safely through the Suez canal—have now, according to the latest reports, reached the following points on their outward journey: The frigate "Tordenskjold" arrived at Singapore on the 30th of August, 1870; the "Great Northern" arrived at Point de Galle on the 14th of September, 1870; the "Cella" arrived at Seuz on the 12th of September, 1870.

During the paying out, the electrical tests will be entirely under the control of the appointed officers on board, provision being made for connecting up the end on shore, with the signalling apparatus at stated intervals, when only such messages will be sent as shall relate to the expedition. The insulation, or dielectric test, will be kept on almost continually, the only interruption being at certain intervals to measure the discharge, which is arranged so as to indicate "continuity."

The total capacity of the cable being known in Farads, or in terms of a standard condenser on board, a shunt has been adjusted, so that the discharge from the entire cable will be equal to that from the condenser. The signalling apparatus which it is proposed to employ, is the automatic instrument of Sir CHARLES WHEATSTONE. It is much to be regretted, as Mr. LATIMER CLARK has remarked, that the proprietors of long submarine cables are so unwilling to afford any information as to the signalling power of the different systems employed by them. This is the first time on which the automatic system will have been used on a long submarine circuit.

Our Steel Manufactures.

I PURPOSE, in a series of letters, to convey to you the result of a tour of observation made by a party of gentlemen interested in the manufacture of steel. The processes employed to produce this metal are constantly increasing in number and intricacy, and the methods rapidly change, while those for the manufacture of iron show little variation from year to year. Our object, therefore, was to visit those establishments where new processes are employed, and to ascertain what new facts and principles have been developed by practice.

Before indicating any further the motives which have influenced us, I propose to discuss briefly the nature of steel, in order that the values of the several processes investigated may be intelligible. This is all the more necessary, inasmuch as those who have not given the subject special attention generally have incorrect notions about it, and no really definite knowledge of the distinctions between it and the other forms of iron. Much less is there a correct general knowledge of the characteristic distinctions between steels made by different processes.

The first form in which iron usually appears in the arts is that of pig iron. It contains numerous impurities, which it is necessary to remove in order to obtain a malleable metal. Now, it happens that all of these impurities exist in the iron in the elementary state, and are oxidizable, and hence the most obvious way of removing them is to subject them to a melting temperature in the presence of oxygen. The resulting products are nearly pure iron, and a slag formed of the oxidized impurities with oxidized iron. The slag remains liquid and readily separates from the pure iron, which becomes more infusible, and finally solidifies the purer it becomes, notwithstanding the heat increases to the end of the process. The iron is removed in a shapeless lump, and squeezed and rolled into bars. This is the "puddling process," and the wrought-iron of commerce is, with rare exceptions, made in this manner.

To obtain steel it is necessary to add to the purified iron a small quantity of carbon. The rational method of making steel may be said to embrace three conditions:

1. The production of pure iron.
2. The addition of carbon.
3. Melting the mixture or combination, and casting it into ingots.

The last condition is the most difficult to fulfil, on account of the enormous heat required to melt steel; but it is absolutely essential to the production of a good steel. There is a peculiar product of the puddling furnace, known as puddled or semi-steel, which is made by stopping the refining process before all the impurities (chiefly carbon) are oxidized. But metallurgists and mechanics hold it in low esteem, since it is irregular in its mechanical structure, unreliable in its properties, and most dangerous when most relied upon. But there is no difficulty about the properties of a cast-steel. They are uniform and reliable, and can be managed with wonderful precision in the manufacture.

Another point to which it is necessary to call particular attention is, that those properties which are distinctly steel properties are proportioned, in degree, to the amount of contained carbon. A steel may be, and often is, made so free from carbon and so soft as to present most of the properties of wrought-iron, and yet maintain also the principal properties of steel, solely by virtue of the fact that it has been cast, and hence is finer in texture, stronger, and even tougher than wrought-iron; but, above all, is thoroughly homogeneous. A soft or "low steel" contains sometimes as little as one-tenth, or even one-twentieth of one per cent. carbon, while a hard or high steel contains usually from three-quarters to one and one-quarter per cent. It is, moreover, a common idea, that anything which may be called steel is not only valuable, but is valuable for every purpose to which a strong metal can be applied. On the contrary, most steels have very narrow limits of utility. High steel is suitable for cutting and punching tools, and worthless for almost everything else. Low steel is excellent for resisting transverse and tensile stress and torsion, and useless for tools. For purposes where welding is required, and for "built-up" forgings, wrought-iron is better than either. If these few facts be kept in view, much that is mysterious in the manufacture of steel will become clear.

The first point visited by the party was the Trenton Iron-works, at Trenton, N. J. This establishment is owned by Messrs. COOPER & HEWITT, to whose enterprise the country owes the successful introduction of the Siemens-Martin process, which promises to be of very great value. It has two characteristic features—first, the peculiar furnace in which the steel is converted, and, second, the method of bringing together the materials which make the steel.

The Siemens furnace is one of the most important contributions to metallurgy which has been made for a quarter of a century, and certainly merits a particular description.* The fuel employed contains a large proportion of volatile matter. A fire is kindled in an inclined grate, upon which the fuel is heaped to a considerable depth, and burned with a small supply of air. By this imperfect combustion, the carbon of the fuel is converted into carbonic oxide, which is conveyed, with the other volatile matters, by a large flue towards the furnace. Beneath the furnace are four large chambers filled with fire-brick, piled in such a manner as to leave wide interstices. Into the first chamber the gases are passed, and, circulating among the bricks, enter the furnaces. Into the second chamber atmospheric air enters, and passes through it into the furnace, mingling at the throat with the gases, and supplying oxygen for their combustion. The products of combustion passing out through the third and fourth chambers, impart their heat to the fire-bricks, and pass at a reduced temperature to the chimney. At length the bricks in the third and fourth chambers become very hot, and when they are thoroughly heated, the course of the air and gas currents is reversed by means of valves, so that they enter the furnace after passing among the hot bricks, while the products of combustion pass off through the cold chambers. The effect of this is to raise the temperature of the gases prior to combustion, and when they burn, the heat developed is correspondingly increased. In due time, the first and second chambers become hotter than were the third and fourth, until the current is again reversed. Each reversal increases the heat of the chambers, so that the ultimate heat of the furnace will be that which is due to the heat of combustion, added to that received from the chambers. The temperature of the Siemens furnace is fifty to one hundred per cent. greater than that of the common puddling furnace, and considerable difficulty is experienced in obtaining materials sufficiently refractory to endure it.

The Martin process consists in adding to a bath of molten cast-iron successive quantities of wrought-iron, in such proportions that the mixture contains the percentage of carbon requisite to make steel of the desired grade, and keeping the metal fluid in a Siemens furnace until ready for casting. During the heat, oxide of iron is formed in the bath of metal, which, if allowed to remain, would render the iron "red short"—that is, liable to go to pieces in the rolls or under the hammer. To remove this, spiegeleisen is added—a variety of cast-iron containing manganese. This latter element attacks the oxide of iron, decomposes it, appropriates its oxygen, setting the iron free, and combines, as oxide of manganese, with the silica contained in the slag. Spiegeleisen also contains a large percentage of carbon; and in mixing the various ingredients, this is allowed for in such a manner that the resulting metal shall contain the desired proportions exactly. It is an admirable feature of this process, that the metal can be maintained in the liquid state indefinitely, and the proportions controlled with approximate precision.

The metal made at Trenton belongs to the class of low steels. It is capable of rolling into plates or homogeneous bars, of much higher strength than wrought iron, and of greater toughness. It is also possible, and easy, to make by this method a high steel, but it is inferior to the best crucible steel for tools. The low steel is probably the equal of the best steel in the world for plates and parts of machinery where great strength, lightness and reliability are required, and where cost is a small consideration. The cost of manufacture depends most largely on the cost of materials. The cast-iron must be free from phosphorus, and hence is usually an expensive iron. The wrought-iron is always somewhat expensive, though scrap-iron is used whenever it can be bought of requisite purity. The cost has also been considerably diminished by the use of charcoal blooms, puddle-ball iron, sponge, and those forms which have not been subjected to the expensive mechanical treatment of reheating, hammering, or rolling. In this way it is claimed that the ingots can be made at a cost of $85 per ton. When the subsequent mechanical treatment is added, the cost will be raised considerably above $100 to make the steel fit for the market. Hence there is no present prospect that the Siemens-Martin steel will compete with the Bessemer for railway purposes. One defect which it shows in common with all these cast malleable metals is, that it cannot be subjected to a high heat without injury, nor be made to weld except with great difficulty, and never so closely as wrought iron. But this defect is much lessened by the fact that there is seldom any occasion to weld these metals, since they are cast into ingots of large size, and rolled or hammered into their ultimate shapes, thus being capable of making many pieces from one, instead of one from many. The Trenton Iron Works at present use but one furnace for making steel, the product of which is from three to four tons in twelve hours. The same process is employed at the Bay State Iron Works, in Boston, where a similar product is made. The industry promises exceedingly well, and for the purposes mentioned, probably supplies the most desirable metal in the world.—*Correspondence of the New York Times.*

* An engraving and complete description of this furnace may be found in this JOURNAL of July 5, 1870.—ED.

Heinrich Gustav Magnus.

By A. OPPENHEIM.

IN giving expression to the sympathy generally excited by the loss of MAGNUS, Professor TYNDALL has raised the interest of the British public in a philosopher's life, simple, yet most eminently useful. At the present moment a mere outline of it is all we can venture to offer. Unable to appease, it may yet prove sufficient to keep up the interest in MAGNUS' life until a fuller biography will do more ample justice to his merits.

HEINRICH GUSTAV MAGNUS was born on the 2d of May, in the year 1802. Four years later, Berlin, his native town, had to resign its position as the residence of an independent kingdom. The French war raged with ever-increasing fury, and though Mr. MAGNUS, the banker, found the means of sheltering his children from the most severe consequences of the national calamity, their youth was naturally a severe one. It appears more than probable that the energy and ambition which raised all of them high above the level of mediocrity, may have originated in the stern impressions of their childhood. Thus one of the brothers, EDWARD, rose to the highest distinction as an historical painter, and is now one of the ornaments of the Berlin Academy of Arts. A younger brother distinguished himself as a physician; while the eldest, whose death preceded that of GUSTAV by some months only, continued and extended his father's banking business. A son of the latter became prominent during the last war in Mexico, where, representing Prussia at the court of MAXIMILIAN, he showed great energy in his endeavors to save that misguided monarch's life.

The peculiar talents of HEINRICH GUSTAV showed themselves at an early age. He exhibited a rare proficiency in mathematics when a mere child, and soon expressed a wish to devote himself to the study of nature. At the Berlin University, founded some years before, the chair of Chemistry had passed from the hands of KLAPROTH into those of MITSCHERLICH, who was then at the height of his reputation. Young MAGNUS was twenty-three years old when he published his first paper on the pyrophoric nature of finely divided metals. Two years later he received his doctor's degree, and published a dissertation on tellurium. He subsequently passed twelve months at Stockholm, in the laboratory of BERZELIUS, who gave to Germany some of its greatest *savans*, of whom WÖHLER, in Gottingen, and GUSTAV ROSE, in Berlin, now alone survive. From Sweden he removed to Paris, returning to Berlin in 1831, and began there his university career as a lecturer on technology, a subject which he continued to teach till last summer.

Nearly all his researches published during this time and up to 1833 were devoted to pure chemistry. A latent interest for natural philosophy can, however, be traced already in his earlier publications. Thus he determined the temperature at

which oxide of iron is reduced by hydrogen, and analyses of several minerals were followed by determinations of the decrease of density which vesuvian and granite undergo in fusion. These determinations excited much interest at a time when the doctrine of isomerism was making its first appearance, and every two substances having the same composition and yet exhibiting different properties, were subjects of astonishment and of doubt. He even published papers on capillarity, and on the temperature of the interior of the earth, and a thermometer fitted to register the same, as early as 1832. But the researches on which his early fame was founded are of a strictly chemical nature. A paper on the combinations of protochloride of platinum, in 1828, contained the description of what is now called Magnus' salt, one of the first known of that important series of metallic ammonium salts, which acquired later an increased importance as a support of the theory of substitution, and a link between mineral and organic chemistry. Five years later, 1833, appeared his paper on the decomposition of ethyl-sulphuric acid, and on two new acids, ethionic and isothionic acids. These acids (together with the sulpho-benzolic acid, discovered by MITSCHERLICH, in 1834) became the starting point of numerous discoveries. They increased our knowledge of isomerism; they prepared the way for the modern views on the constitution of natural bodies, and they enabled STRECKER, in 1854, to form artificially a constituent substance of bile taurin.

In the same year (1833) another important discovery concluded, so to speak, MAGNUS' career as a chemist. Together with AMMERMULLER, a doctor of medicine, and head master of a public school in Wurtemburg, he published his researches on iodic acid.

When MAGNUS appeared again before the scientific world, it was in a new science. He was created Professor of Natural Philosophy in 1834, and no research of his was published during the following three years, evidently spent in qualifying himself for his new position. Researches on steel magnets and on the boiling of liquids reopened the series of his discoveries in 1836; still he had not escaped the sway that chemistry exercised over his mind. Papers on the composition of a fossil resin, ozokerite, on the gases contained in blood, and on the combination of ethylene with sulphuric anhydride (carbyl-sulphate) were published in 1837 and 1838, and even later researches on the formation of tar from ethylene, and on the allotropic modifications of sulphur (1856),* show how much chemistry lost when natural philosophy took possession of MAGNUS's talents and energies. Later his modesty urged him to disclaim the honors so largely gained through his chemical researches. When after the opening of a university laboratory by Professor A. W. HOFMANN, the expanding scientific interest led to the formation of the German Chemical Society (in 1867), MAGNUS could only be prevailed upon with difficulty to become one of its vice-presidents, and although he worked on the committee with zeal, offering assistance and advice wherever it was needed, and publishing a paper on the diathermancy of chloride of potassium in the reports of the Society, he pretended that he had lost all claims to be regarded as a chemist.

We have to revert, therefore, to the second side of his scientific work, his researches in natural philosophy. A determination of the expansion of air, instituted at the same time (1842) and in an analogous manner, by MAGNUS in Berlin, and by REGNAULT in Paris, and yielding all but absolutely the same numerical results, proved the exactness of both physicists. The most admirable conformity distinguished likewise researches on the tension of vapors, which both savans executed independently of each other in 1844, by entirely different methods. Relating chiefly to the tension of steam, the results thus obtained are as important for practical as for scientific purposes. Researches on the tension of vapors given off by mixtures of different liquids, and a comparison of the mercury thermometer and the air thermometer, preparatory to the great investigations just referred to, were published at the same time.

In 1855, MAGNUS investigated the form which jets of water assume when issuing from apertures of different shapes, and thereby opened to experimental study the surface-tension of liquids. His inquiry extended to the manner in which the motion of the aperture influences the form of the jet. Two years later he published detailed investigations on electrolysis. The discussion of this complicated question he founded on the theory of chemical substitutions. The temperature of vapors and the conducting power of gases formed the subject of his researches up to 1861. Until then gases had been considered as non-conductors. He proved that hydrogen conducts heat in the same way as do solid bodies, and thereby established a new and striking analogy between this element and metals.

During the last years of his life, the radiation of heat formed the chief objects of his researches. A paper on the polarization of the dark rays of heat, the discovery of the diathermonous nature of native chloride of potassium, and, lastly, a full research on the emission, absorption, and reflection of heat radiated at low temperatures, were the results of this protracted and fertile investigation. He showed that heat from different sources is refracted under different angles, and absorbed in different proportions by the chlorides of sodium and of potassium, by fluorspar and other substances. He thus proved that, if our eyes are able to distinguish different rays of heat, we should see the different substances glowing in the most varied colors at ordinary temperatures, just as we see them emit different rays of light when exposed to heat and observed with the spectroscope.

The receptacle of all his researches is the "Annals of Chemistry and Natural Philosophy," (*Annalen der Chemie und Physik.*)

* The latter investigation contained an error which was afterward corrected by its author, and originated a new discovery. MAGNUS found that sulphur acquired a deep red or black odor when fused with minute quantities of various organic substances. This change was at first ascribed by him to an allotropic modification of the element.

published by his friend POGGENDORFF. He formed a fine collection of scientific apparatus, afterwards bought by the University, and put under his control. As a lecturer, MAGNUS was a pattern of clearness. He loved teaching, and his diction, though plain, showed the high culture of his mind. While in his lectures he aimed at being comprehensible to the large number of students who wished to learn the rudiments of science, he instituted special classes for those who longed to enter into a deeper study of natural philosophy. Graduates and undergraduates assembled around him once a week, to enjoy what he called physical conversations. Here students in turn reported on investigations recently published, the master criticizing the report, and opening a discussion on those points which appeared to deserve a fuller explanation. Some favored pupils were instructed in the methods of physical researches in his private laboratory, the master allotting subjects to them, urging them, above all, to exactness, and warning them against drawing hasty conclusions from their experiments. Many professors of natural philosophy, who have since obtained fame or reputation, have been educated in these classes. From a long list of names, we will but mention those of TYNDALL, CLAUSIUS, WIEDEMANN, HEUSSER, QUINCKE, PALZOW, VILLARI, and KUNDT.

The laboratory joined his apartment, and he was thus enabled to watch from his sick bed the investigations that occupied his thoughts. MAGNUS's health had been impaired for many months. He was suffering when he visited the last meeting of the British Association at Exeter. He was ill when he presided at the banquet given to Professor HOFMANN, on the 8th of January. Still he continued his work up to the beginning of February, when weakness and excrutiating pain forced him to give up his lectures. He foresaw his death, and made the most minute arrangements, order being one of the characteristic properties of his mind. "I have written to you to ask for your advice," he addressed his physician, "but I foresee that my case will give you but little satisfaction."

MAGNUS married the daughter of M. HUMBLOT, a well-known publisher. His wife, as well as two daughters and one son, survive him. The circle that assembled at his house was very large, and included the leading members of every profession, members of the university, merchants, statesmen, and artists. But he was equally accessible to every unknown youth who wanted his advice and assistance. Ever ready to help, he bestowed his aid as if he received, not as if he conferred a favor. Gentle-mannered, conciliatory, and persuasive, he was the mediating element of every society. Nothing can show better the kindness of his disposition than the love which, not his family or his pupils only, but even his domestics bore for him. "Why will you make life difficult to yourselves?" he would sometimes ask. "Is it not sufficient your Master should make it difficult for you?"

His death is, therefore, felt, not only as a severe loss to science, but as a personal pain, by all who had the good fortune of approaching him. Numerous were those who, on the 8th of April, thronged the room where his coffin stood, hidden under palms and flowers. Some parting words were spoken by Dr. MULLENSIEFEN, Professor of Divinity, and a song of MENDELSSOHN, sad, yet cheering, ascended from his grave.—*Nature.*

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108,082.—COVER OF CULINARY BOILER.—Paschal J. Abbott and John Abbott, Dexter, Me.

108,083.—MEAT AND VEGETABLE MASHER.—George A. Anderson and Charles J. Baker, Albany, N. Y.

108,084, antedated October 4, 1870.—CRUCIBLE FOR MELTING IRON AND STEEL.—James E. Atwood, Pittsburg, Pa.

108,085.—GEARING FOR WAGON.—John B Auger, Poughkeepsie, N. Y.

108,086—BAKE-OVEN.—Adam A. Aull and John A. Aull, Bellefontaine, Ohio.

108,087, antedated September 20, 1870.—COMBINED PUMP AND SIPHON.—John D. Averell and George A. Higgins, New York, N. Y., and Thomas Gordon, Shrewsbury, N. J., assignors to George A. Higgins.

108,088.—PROCESSES FOR THE MANUFACTURE OF CARBONATE OF SODA, HYDROCHLORIC ACID, &c.—Haydn M. Baker, Washington, D. C.

108,089.—MANUFACTURE OF ALUMINATE OF SODA.—Haydn M. Baker, Brooklyn, E. D., N. Y.

108,090.—MANUFACTURE OF NITRIC ACID.—Haydn M. Baker, Williamsburg, N. Y.

108,091.—SHEARS FOR CUTTING FLOWERS.—Joseph W. Barbour, Winooski Falls, Vt., assignor to himself and Elisha Allen, same place.

108,092.—BUFFING APPARATUS FOR FINISHING SPOONS.—Harry Barrett, Brooklyn, N. Y.

108,093.—POTATO-DIGGER.—Abner L. Bausman, Minneapolis, Minn.

108,094—HORSE HAY-FORK.—Stewart Bebout, Waterford, Ohio.

108,095.—PLOW.—Bengt C. Blomsten, Waupaca, Wis.

108,096.—DEVICE FOR OPENING AND CLOSING FANS.—George Bordes, New York, N. Y.

108,097.—MANUFAUTURE OF BISCUIT.—Charles D. Boss and C. D. Boss, Jr., New London, Conn.

108,098.—LOCK.—James Brady, Branford, Conn., assignor to "The Branford Lock Works," same place.

108,099.—LOCK.—James Brady, Branford, Conn., assignor to "The Branford Lock Works," same place.

108,100.—MACHINE FOR BRUSHING YARN.—John Brady, Fall River, Mass.

108,101.—CHOCK FOR HOLDING ROPES.—Dominic D. Brown, Oswego, N. Y.

108,102.—MANUFACTURE OF SEMOLINA AND FLOUR.—Gustav A. Buchholz, Regent's Park, London, England.

108,103.—MANUFACTURE OF SEMOLINA AND FLOUR.—Gustav A. Buchholz, Regent's Park, London, England.

108,104, antedated September 30, 1870.—MOUSE-TRAP.—Edward Buckman and Alexander Buckman, Brooklyn, N. Y.

108,105.—STOVE-FASTENER.—James C. Burdin, Ladoga, Ind.

108,106.—LAMP.—Orange M. Chamberlain, New York, N. Y. assignor to himself and George Moore, same place.

108,107.—RAILROAD-TICKET.—Charles A. Chamberlain, Pittsburg, Pa.

108,108.—BRUSH.—Richard Jaques Combs, Bergen, N. J.

108,109, antedated October 5, 1870.—CANDLESTICK.—Francis C. Cone, San Francisco, Cal.

108,110, antedated October 5, 1070.—FOUNTAIN-PEN.—Francis C. Cone, San Francisco, Cal.

108,111.—SYRINGE.—George Conover, Mott Haven, N. Y.

108,112.—IRON-FENCE.—Sommers Crowell, Philadelphia, Pa.

108,113.—MACHINE FOR SETTING UP BARREL.—Amos Cutter, Boston, Mass.

108,114.—MACHINE FOR CUTTING LOCK IN HOOPS.—Amos Cutter, Boston, Mass.

108,115.—MACHINE FOR MAKING BARREL-HEADS.—Amos Cutter, Boston, Mass.

108,116, antedated September 24, 1870.—MACHINE FOR BLOCKING AND STRETCHING HATS.—Joseph De LaMar, Brooklyn, N. Y., assignor to himself and John De Vries, New York City.

108,117—POTATO-DIGGER.—William Dillon, Sonoma, Cal.

108,118.—FEED-CUTTER.—Carles R. Donner, Sonora, Cal.

108,119.—TOBACCO-CUTTER.—Jurias G. Dreher, Pine Grove, Pa.

108,120.—GRAIN-SEPARATOR.—Anthony Duus, San Francisco, Cal.

108,121.—MACHINE FOR FELTING.—Rudolf Eickemeyer, Yonkers, N. Y., assignor to John T. Waring, same place.

108,122.—ADJUSTABLE PILLOW.—Henry Eilers, Cincinnati, Ohio.

108,123, antedated September 26, 1870.—APPARATUS FOR BENDING RAILROAD RAIL.—George D. Emerson, Calumet, Mich.

108,124.—CAR-COUPLING.—Lewis A. Evans, Chester, Pa., assignor to himself and W. C. Boatwright, same place.

108,125.—WASHING-MACHINE.—Franklin Feazel, Lacon, Ill.

108,126.—HAND CORN-SHELLER.—John E. Finley, Memphis, Tenn.

108,127.—DEVICE FOR STARTING STREET CAR.—George P. Frick, Baltimore, Md.

108,128.—SPRING-MATTRESS.—Charles Fulton, New York, N. Y.

108,129.—COMPOSITION FOR WELDING AND RESTORING STEEL.—Thomas Fyans, Taunton, Mass., assignor to himself and A. T. Thomson, same place.

108,130.—CAR-ROOF.—John Garcy, Cleveland, Ohio.

108,131.—SASH-CORD FASTENER.—Christian Gies, New York, N. Y.

108,132.—"SOLE-SEWING-MACHINE."—John P. Greely, Boston, assignor to himself, Joseph B. Leonard, Chelsea, and Benjamin Greely, Dedham, Mass.

108,133.—NECK-TIE.—Louis A. Grill, New York, N. Y.

108,134.—PERMUTATION LOCK.—Henry Gross, Cincinnati, Ohio.

108,135.—CANE-STRIPPER.—Constantine Alexander Hege, Friedberg, N. C.

108,136.—TRUNNION FOR STEAM ENGINE AND CALENDER.—T. Hill, Vallejo, Cal.

108,137.—VALVE-GEAR FOR STEAM ENGINES.—Thomas Hill, Vallejo, Cal.

108,138.—COMPOSITION FOR WELDING, PUDDLING, AND BRAZING METALS.—Anthony J. Hinpemeyer, Philadelphia, Pa., assignor to S. C. Collins, same place.

108,139.—APPARATUS FOR FINISHING TERRET.—Constantine Hingher, New Brunswick, N. J.

108,140.—SWAGING-MACHINE.—George M. Hinkley, Milwaukee, Wis.

108,141.—BUTCHER'S KNIFE.—Peter Houseman and Caleb C. Campbell, Rural Retreat, Va.

108,142.—RAILWAY-RAIL JOINT.—George Augustus Huddart, Brynkir, Wales.

108,143.—HINGE.—Abraham Huffer, Hagerstown, Md.

100,144.—WINDOW-WASHER AND SCRUBBING PAD.—Joseph Clark Hull, Meadville, Pa.

108,145.—COMPOSITION FOR PRINTING-ROLLER.—Israel G. Husted, Brooklyn, N. Y.

108,146.—WATER-CLOSET HOPPER.—Alfred Ivers, New York, N. Y.

108,147.—MACHINE FOR MANUFACTURING CHAIR-SEAT.—Edwin S. Jackson, Bethel, Vt.

108,148.—ROTARY ENGINE.—Henry Jamieson, Williamsburg, N. Y.

108,149.—PLOW.—John R. P. Jett, Knoxville, Tenn.

108,150.—EMBROIDERING ATTACHMENT FOR SEWING-MACHINE.—Albert W. Johnson, Middletown, Conn.

108,151.—UMBRELLA.—Frederick Johnson and William Hatchman, London, England, assignors to Thomas C. Morton, Paton, N. Y.

108,152.—COOKING-STOVE.—John H. Jones, Memphis, Tenn.

108,153.—PERMUTATION-LOCK FAUCET.—William F. Jones, Baltimore, Md., assignor to himself and C. A. Edmondston, Halifax, N. C.

108,154.—FEEDING DEVICE FOR FANNING MILL.—Nathan Kibler, Milton, Ill.

108,155.—SASH-HOLDER.—George King, Frederick, Md.

108,156.—STEAM ENGINE.—Frank E. Kirby, New York, N. Y.

108,157.—MANUFACTURE OF POTTERY-WARE.—Isaac W. Knowles, East Liverpool, Ohio.

108,158.—APPARATUS FOR PRECIPITATING GOLD AND SILVER FROM SOLUTIONS.—William S. Laighton, Norwich, Conn.

108,159.—COTTON-CULTIVATOR.—Peter R. Leatherman, Woodville, Miss.

108,160.—MAT.—Samuel Lewis, Williamsburg, N. Y.

108,161.—LEATHER-RENOVATOR.—William G. Lumbard, Georgetown, Ill.

108,162.—GOVERNOR FOR STEAM-ENGINE.—John D. Lynde, Philadelphia, Pa.

108,163.—HEATING-STOVE.—William Magill, Port Deposit, Md.

108,164.—SUBSOIL-PLOW.—Lucian V. B. Martin, Tuscaloosa, Ala.

108,165.—PILE FOR CORRUGATED BEAMS.—Richard Montgomery, New York, N. Y.

108,166, antedated September 24, 1870.—TRUNK-LOCK.—Joseph Morgan, New York, N. Y.

108,167.—TRAY FOR GAS-PURIFIER.—Peter Munzinger, Philadelphia, Pa.

106,168.—WASHING-MACHINE.—George R. Nebinger, Philadelphia, Pa.

108,169, antedated October 1, 1870.—APPARATUS FOR EVAPORATING SORGHUM JUICE, COOKING FEED, &c.—Thomas J. Newby, Richmond, Ind.

108,170.—COLORTROPE.—Oscar Nicholson, New York, N. Y.

108,171.—SASH-FASTENER.—John G. Nicolay, Springfield, Ill.

108,172.—UNIVERSAL-JOINTED TREADLE.—Alfred Nielson, New York, N. Y.

108,173, antedated October 1, 1870.—TRANSMITTING-POWER APPARATUS.—Richard W. Norwood, Courtland, Ala.

108,174.—STEAM GENERATOR.—Samuel B. B. Nowlan, New York, N. Y.

108,175.—MACHINE FOR FORMING HAT-BODIES.—Isaiah Nutt, Newark, N. J., assignor to himself, John Wharton, and Abraham C. Wheaton, same place.

108,176.—COMBINED PLOW AND SCRAPER FOR ROADS.—Thomas B. Parker, Lincsville, Pa.

108,177.—MANUFACTURE OF PAPER.—H. Pemberton, Allegheny City, Pa.

108,178.—HORSE-POWER.—Lewis A. Peter, Neffs, Pa.

108,179.—THREE-HORSE EQUALIZER.—John Casper Pfeil, Arenzville, Ill.

108,180.—FIRE-PLACE.—Thomas Phillips, Cadiz, Ohio.

108,181.—WOOD PAVEMENT.—A. Warner Platt, New York, N. Y.

108,182.—WINDOW-BLIND.—S. Pocock, Woodstock, Canada.

108,183.—COMBINED ELEVATOR AND CONVEYER.—T. J. Powell, Napies, N. Y.
108,184.—PARLOR-SKATE.—John Pollitt, Indianapolis, Ind., assignor to himself and Lyman Martin, same place.
108,185.—AUTOMATIC VENTILATOR.—Benjamin F. Prentis, Benwood, West Va.
108,186.—GATE.—Simon Began and Edward Meusy, Lamotte, Iowa.
108,187.—EXTENSION TRUNK.—James Rice, Middletown, Ind.
108,188.—PISTON-ROD PACKING.—Edward Adison Richmond, San Francisco, Cal., assignor to himself and Charles Watson, same place.
108,189.—MACHINE FOR DRESSING FELLIES.—William H. Rodebeaver, Miamisburg, Ohio.
108,190, antedated September 20, 1870.—CURTAIN-FIXTURE.—Franklin Root, Hartford, Conn.
108,191.—REMOVING GREASE FROM WASTE LEATHER.—John P. Rust, Peabody, Mass.
108,192.—APPARATUS FOR WATER-PROOFING FABRICS WITH GUTTA-PERCHA.—Ernst A. Schnette, New York, N. Y.
108,193.—CASTER FOR TRUNK—Morris Schwerin, Newark, N. J.
108,194.—SASH-FASTENER.—Philip T. Share, Baltimore, Md.
108,195, antedated September 26, 1870.—FLOWER TRELLIS.—Philo B. Sheldon, Bath, N. Y.
108,196.—FERTILIZER DISTRIBUTER.—J. J. Singleton, Forsyth, Ga.
108,197.—COMBINED CORN-HARVESTER AND HUSKER.—Augustus Smith, Pontiac, Ill.
108,198.—PURIFYING BRINE FOR THE MANUFACTURE OF SALT.—Filmore M. Smith, Syracuse, N. Y.
108,199.—WASH FOR THE CURE OF SCAB IN SHEEP, &c.—H. Smith, San Francisco, Cal.
108,200.—CARPET-FASTENER.—John H. Stanton, Franklin, Ohio.
108,201.—SAW-MILL.—Fred T. Stevens, Columbia, N. H.
108,202.—APPARATUS FOR HEATING AND VENTILATING BUILDINGS.—Joel Stover, Richmond, Ind.
108,203.—EGG-BEATER.—Daniel M. Swartz, Lewisburg, Pa.
108,204.—SASH-HOLDER.—Hiram B. Swartz, Milton, Ohio.
108,205.—ADJUSTABLE TUYERE.—Peter Sweeney, New York, N.Y.
108,206.—SLEIGH-LOCK.—Freeman Talbet, Cleveland, Minn.
108,207.—SHUCK-HACKLING MACHINE.—William H. Tappey, W. C. Lumsden and Alexander Steel, Petersburg, Va.
108,208.—PRESS.—William I. Tate, Philadelphia, Pa., assignor to himself and Henry R. Mitchell, same place.
108,209.—WATER-WHEEL.—Albert P. Teachout, Madison, Ohio.
108,210.—SASH-FASTENER.—William H, Thomas, Brooklyn, N. Y., assigner to Turner, Seymour & Judds, Wolcottville, Conn.
108,211.—COOKING-STOVE.—Edgar L. Thomson and Abraham Hursh, Philadelphia, Pa., assignors to Hattie B. Thomson and Abraham Hursh, same place.
108,212.—HEATING-STOVE.—Alvah Traver, Troy, N. Y.
108,213.—SEED-PLANTER AND GUANO-DISTRIBUTER.—William L. Trayuham, Warrenton, Ga.
108,214.—GANG-PLOW.—James Wilson, Treadway, Crown Point Centre, N. Y., assignor to Oliver A. Whittemore, Denver, Colorado.
108,215, antedated September 26, 1870.—STEAM-TRAP.—Seth D. Tripp, Lynn, Mass.
108,216, antedated October 1, 1870.—LEATHER-BUFFING MACHINE.—Seth D. Tripp, Lynn, Mass.
108,217.—DITCHING-MACHINE.—Henry Vannatta, Jefferson, Ill.
108,218, antedated October 1, 1870.—HANDLE FOR CANES AND UMBRELLAS.—Albert Wanner, Hoboken, N. J.
108,219.—COOKING-STOVE.—Leroy D. Webber, La Porte, Ind.
108,220.—COOKING-STOVE.—Alexander Wemyss, Philadelphia, Pa.
108,221.—LANTERN.—William Westlake, Chicago, Ill.
108,222.—LANTERN.—William Westlake, Chicago, Ill.
108,223.—NUT-LOCK.—Shepherd H. Wheeler, Dowogiac, Mich.
108,224.—TOY-LOCOMOTIVE.—James E. Wickham, Hartford, Ct.
108,225.—MACHINE FOR MAKING NAILS.—Alonzo P. Winslow, Cleveland, Ohio.
108,226.—WASH-BOILER.—H. T. Woodman, Dubuque, Iowa.
108,227.—FENCE.—Nathan Woolsey, Ottawa, Ill.
108,228, antedated October 1, 1870.—STONE-CUTTING MACHINE.—Hugh Young, of Middletown, Conn., and James L. Young, New York, N. Y.
108,229.—LEATHER-CUTTING MACHINE.—A. L. Zent, Roanoke, Ind.
108,230.—PROPELLING VESSELS.—Jean L. Arman, Bordeaux, France.
108,231.—ANVIL-LAST.—David Brainbridge, Philadelphia, Pa.
108,232.—CHURN-DASHER.—Silas E. Bauder, Birmingham, Ohio.
108,233.—APPARATUS FOR SPINNING HEMP, FLAX, AND OTHER FIBROUS SUBSTANCES.—Ernest Bazin, Paris, France.
108,234.—CURLING-IRON.—Jeffrey O. Bentley and James Jackson, Philadelphia, Pa.
108,235.—EXTRACTING IRON FROM THE SLAG OF BLAST-FURNACE.—Edward James Bird, Frostburg, Md.
108,236.—SPRING-FAN.—Otto Brueck, New York, N. Y.
108,237.—PUMP-VALVE.—David W. Clark, Tidioute, Pa.
108,238.—ROAD-SCRAPER AND DITCHER.—George Clark, Dover, Del., assignor to himself, Franklin B. Ives, Tiskilwa, and R. L. Dean, Dover, Ill.
108,239.—CORN-PLOW.—William C. Clifton, Elk River township, Iowa.
108,240.—COOK-STOVE.—William C. Davis, Cincinnati, Ohio.
108,241.—DISINTEGRATING FIBROUS MATERIAL FOR PAPER-PULP, &c.—August Hermann Franz Deininger, Berlin, Prussia.
108,242.—WATER-ELEVATOR.—Isaiah Dekle, Thomasville, Ga.
108,243.—PLOW.—Isaac Eastwood, Lanark, Ill.
108,244.—BEE-HIVE.—Charles Embrey, Williamsport, Md.
108,245.—CASTING DENTAL PLATE.—John U. L. Feemster, Greencastle, Ind., assignor to George W. Scott, same place.
108,246.—FLOUR-BOLT.—Jacob Fickinger, Kingsville, Ohio.
108,247, antedated October 1, 1870.—PLOW.—Asahel Franklin and Francis M. Franklin, Springfield, Ohio.
108,248.—DITCHING-MACHINE.—Samuel F. Gard, New Orleans, La.
108,249.—FEED-CUTTER.—Frank E. Garner, Cornwall, Conn.
108,250.—SAW-MILL.—David G. Gay, Eugene City, Oregon.
108,251.—MAIL-BAG FASTENER.—David G. Gay, Eugene City, Oregon.
108,252.—TRUSS.—Jacob Geiss, Belleville, Ill.
108,253.—TRUSS.—John Goodier, Philadelphia, Pa.
108,254.—CAR-COUPLING.—William F. Grasler, Muncy, Pa.
108,255.—ROCKING-CHAIR.—Charles Grawitz, Buffalo, N. Y.
109,256.—SHUTTER-FASTENER.—Henry Grow, Philadelphia, Pa., assignor to himself and William Grow Smith, Norristown, Pa.
109,257.ELECTRO-MAGNETIC BURGLAR ALARM.—W. B. Guernsey, Jersey City, N. J.
108,258.—BAKE-OVEN.—James Hall, Cincinnati, Ohio.
108,259.—BELT-GEARING.—George B. Hamlin, Willimantic, Conn.
108,260.—CULTIVATOR.—Venendo P. Harris, Greensburg, Ind.
108,261.—REVERSIBLE KNOB-LATCH.—A. M. Hill, New Haven, Conn.
108,262.—GUANO-DISTRIBUTER AND SEED-SOWER—Benjamin F. Hunkley, Baltimore Md.
108,263.—DRY-GAS METER.—Perry Hodge, Seneca Falls, N. Y.
108,264.—PUMP.—David O. Holman, Adams, N. Y., assignor of one-half his right to J. P. Sanders, same place.
108,265.—PUMP.—David O. Holman, Adams, N. Y.
108,266.—WASHING-MACHINE.—B Illingworth, Freeport, Ill.
108,267.—AUGEI-HANDLE.—William A. Ives, New Haven, Conn.
108,268.—DOOR-SPRING.—William F. Kells, San Francisco, Cal.
108,269.—MACHINE FOR CLEANING AND DITCHING RICE-FIELDS.—Samuel M. King, Lancaster, Pa.
108,270.—HOLDER FOR SPINNING RING.—George W. Knight, Hopedale, Mass., assignor to George Draper & Son, same place.
108,271.—MANUFACTURE OF BLACKING.—Joseph L. Lucas, Saratoga Springs, N. Y,
108,272.—SHOVEL-PLOW.—Luppe Luppen, Pekin, Ill.
108,273.—SHOVEL-PLOW.—Luppe Luppen, Pekin, Ill.
108,274.—SHOVEL-PLOW.—Luppe Luppen, Pekin, Ill.
108,275.—SHOVEL-PLOW.—Luppe Luppen, Pekin, Ill.
108,276.—SHOVEL-PLOW.—Luppe Luppen, Pekin, Ill.
108,277.—RAILWAY-CAR AXLE-BOX.—George F. Lynch, Milwaukee, Wis.
108,278.—WORK-BOX.—James E. Marvel, Seaford, Del.
108,279.—HARROW.—John Mellinger, Greensburg, Pa.
108,280.—TREE-BOX.—Harry Merrick, Brooklyn, N. Y.
108,281.—LOOM.—John Miller, Eldridge, Ill.
108,282.—KING-BOLT.—F. B. Morse, Plantsville, Conn.
108,283.—DIE FOR SWAGING CARRIAGE-CLIP.—Francis B. Morse, Plantsville, Conn., assignor to H. D. Smith & Co., same place.
108,284.—IMPREGNATING FIBROUS MATERIAL FOR PACKING, &c.—Eliza D. Murfey, New York, N. Y.
108,285.—SATURATING FIBROUS MATERIAL WITH POWDERED SUBSTANCES, FOR BEARINGS AND PACKING.—Eliza D. Murfey, New York, N. Y.
108,286.—MATERIAL FOR PACKING AND BEARINGS.—E. D. Murfey, New York, N. Y.
108,287.—MANUFACTURE OF STEEL.—Charles Motier Nes, York, Pa.
108,288.—APPARATUS FOR COOKING AND EVAPORATING.—Thomas J. Newby, Richmond, Ind.
108,289.—FRUIT-DRIER.—Joseph B. Okey, Indianapolis, Ind., assignor of one half his right to Ferdinand A. Lehr.
108,290.—MOLD FOR SHAPING AND DRYING CIGAR BUNCHES.—A. Pearl, New York, N. Y.
108,291.—MANUFACTURE OF VINEGAR.—Paul Plodeck, Cleveland, Ohio.
108,292.—LOOM.—William J. Porter, New York, N. Y., and W. Cross, Jersey City, N. J., assignors to Edward H. Faulkner, New York City.
108,293.—BOX-OPENER.—Nathan Purdey, Providence, R. I.
108,294.—GRAIN-DRILL.—John L. Riter, Brownsville, Ind.
106,295.—FEEDING MECHANISM FOR WOOD-SCREW MACHINERY.—Charles D. Rogers, Utica, N. Y.
108,296.—MITER-MACHINE.—Leander W. Rosecrans, Marshall town, Iowa.
108,297.—CHURN.—Henry Saggan, Newark, N. J.
108,298.—COAL-VAULT GRATE.—George W. Scott, Greencastle, Ind.
108,299.—TRUNK-CLAMP.—Alber J. Sessions, deceased, Bristol, Conn., by Ellen L. Sessions, administratrix, assignor to John H. Sessions, same place.
108,300.—CASTERS FOR TRUNK.—Albert J. Sessions, deceased, Bristol, Conn., by Ellen L. Sessions, administratrix, assignor to John H. Sessions, same place.
108,301.—WELL-TUBE.—A. J. Shirley, Plymouth, Ind.
108,302.—APPARATUS FOR GENERATING GAS FOR HEATING.—Levi Stevens, Washington, D. C.
108,303.—CRUTCH.—John Wentworth Tuttle, Newton, Mass.
108,304.—MOP-HEAD.—William Pierce Valentine, Buffalo, N.Y., assignor to himself and John Robert Drake, same place.
108,305.—PLANING-MECHANISM.—Claus Van Haagen, Philadelphia, Pa., assignor to himself and Anthony Van Haagen, same place.
108,306.—TURNING AND BODING MECHANISM.—Claus V. Haagen, Philadelphia, Pa., assignor to himself and Anthony Van Haggen, same place.
108,307.—MACHINE FOR SAWING STONE.—Luther Ward, Trenton, N. J.
108,308.—HEAD-REST.—Mahlon Warne, Philadelphia, Pa.
108,309.—NECK-TIE.—Hiram P. Wetmore, Elizabeth, N. J., and John G. Hitchcock, New York, N. Y.
108,310.—BORING APPARATUS—Jerome Wheelock, Worcester, Mass.

REISSUES.

4,149.—HOT-BLAST STOVE FOR BLAST FURNACE, &c.—James Henderson, New York, N. Y., and Jasper M. Lawford, Philadelphia, Pa., assignees of John Player, deceased.—No. 65,599, dated June 11, 1867: patented in England, April 21, 1866.
4,150.—APPARATUS FOR HEATING THE BLAST FOR FURNACES USED IN SMELTING IRON, &c.—James Henderson, New York, N. Y., and Jasper M. Lawford, Philadelphia, Pa., assignors of John Player, deceased.—Patent No. 65,600, dated June 11, 1870; patented in England, March 25, 1865.
4,151.—BRUSH.—James McQuade, Lansingburgh, N. Y., assignee of John Marchbank.—Patent No. 53,850, dated November 20, 1866.
4,152.—PRINTING TELEGRAPH.—George M. Phelps, Brooklyn, N. Y.—Patent No. 89,887, dated May 11, 1869.
4,153.—MANUFACTURE OF CAST-STEEL.—Louis La Breche-Viger, Montreal, Canada, assignor to William W. Averell, Bath, N. Y.—Patent No. 95 398, dated September 28, 1869; reissue No. 3,835, dated February 15, 1870.
4,154.—GUN CARRIAGE.—John Wall Wilson, New York, N. Y.—Patent No. 100,482, dated March 1, 1870.

DESIGNS.

4,389.—STOCKING.—Thomas Appleton, Lake Village, N. H.
4,390.—BLACK BOARD ERASER.—Joseph H. Atwater, Providence, R. I.
4,391.—ADVERTISING DESK.—Albert Brummel, Indianapolis, Ind.
4,392.—TYPE.—Robert Bruce, Brooklyn, N. Y., assignor to David Wolfe Bruce, New York city
4,393.—TYPE.—Wallace Bruce, Brooklyn, N. Y., assignor to David Wolfe Bruce, New York City.
4,394.—CARPET PATTERN.—Robert R. Campbell, Lowell, Mass., assignor to Lowell Manufacturing Company, same place.
4,395.—CARPET-PATTERN.—Robert R. Campbell, Lowell, Mass., assignor to Lowell Manufacturing Company, same place.
4,396.—CARPET PATTERN.—Robert R. Campbell, Lowell, Mass., assignor to Lowell Manufacturing Company, same place.
4,397.—CARPET PATTERN.—Robert R. Campbell, Lowell, Mass., assignor to Lowell Manufacturing Company, same place.
4,398.—CARPET PATTERN.—Robert R. Campbell, Lowell, Mass., assignor to Lowell Manufacturing Company, same place.
4,399.—OIL CLOTH PATTERN.—Leonce Francis Dandre, Paris, France.
4,400.—STOVE.—John D. Flansburg, Philadelphia, assignor to Seymour Raymond and Joseph Campbell, Middletown, Pa.
4,401.—TYPE.—Julius Herriet, New York, N. Y., assignor to David Wolfe Bruce, same place.
4,402.—TYPE.—Julius Herriett, New York, N. Y., assignor to David Wolfe Bruce, same place.
4,403.—OIL CLOTH PATTERN.—James Hutchison, Newark, N. J. assignor to Thomas Potter, Son & Co., same place
4,404.—OIL CLOTH PATTERN.—Henry Kagy, Philadelphia, Pa., assignor to Thomas Potter, Son & Co., same place.
4,405.—OIL CLOTH PATTERN.—Henry Kagy, Philadelphia, Pa., assignor to Thomas Potter, Son & Co., same place.
4,406.—OIL CLOTH PATTERN.—Henry Kagy, Philadelphia, Pa., assignor to Thomas Potter, Son & Co., same place.
4,407.—HINGE.—Amasa C. Kasson, Milwaukee, Wis.
4,408.—INKSTAND.—David Merritt, Philadelphia, Pa.
4,409.—FLOOR OIL CLOTH PATTERN.—Charles T. Meyer, Newark, N. J., assignor to Edward C. Sampson, New York City.
4,410.—FLOOR OIL CLOTH PATTERN.—Charles T. Meyer, Newark, N. J., assignor to Edward C. Sampson, New York City.
4,411.—CARPET PATTERN.—Elemir J. Ney, Dracut, assignor to Lowell Manufacturing Company, Lowell, Mass.
4,412.—CARPET PATTERN.—Elemir J. Ney, Dracut, assignor to Lowell Manufacturing Company, Lowell, Mass.
4,413.—CARPET PATTERN.—Elemir J. Ney, Dracut, assignor to Lowell Manufacturing Company, same place.
4,414.—CARPET PATTERN.—Elemir J. Ney, Dracut, assignor to Lowell Manufacturing Company, Lowell, Mass.
4,415.—OIL CLOTH PATTERN.—James Paterson, Elizabeth, N. J., assignor to Thomas Potter, Son & Co., Philadelphia, Pa.
4,416.—OIL CLOTH PATTERN.—James Paterson, Elizabeth, N. J., assignor to Thomas Potter, Son & Co., Philadelphia, Pa.
4,417.—SHOW CASE.—William H. Reiff, Philadelphia, Pa.
4,418.—TEA AND COFFEE SERVICE.—Elizur G. Webster, Brooklyn, N. Y.

EXTENSIONS.

ETHAN ROGERS, Cleveland, Ohio.—Letters Patent No. 15,778, dated September 23, 1856.
SOPHIA A. MORN, of Stamford, Conn., and PHILIP L. MORN, of Worcester, Mass., administrators of the estate of AUGUSTUS R. MORN, deceased.—Letters Patent No. 14,323, dated February 26, 1856; reissue No. 367, dated April 8, 1856.—Improved Mode of Constructing Walls and Floors of Cellars.
HOSEA BALL, of New York, N. Y.—Letters Patent No. 15,753, dated September 23, 1856; reissue No. 3,666, dated October 12, 1869; reissue No. 4,026, dated June 14, 1870.—Oven.
EMILY J. LAMSON, of Weymouth, Mass., executrix of the estate of DANIEL LAMSON, deceased.—Letters Patent No. 15,768, dated September 30, 1856.—Improved Ore Washer.
SAMUEL THOMAS, of Hokendauqua, Pa.—Letters Patent No. 15,827, dated September 30, 1856
CALEB C. WALWORTH, of Boston, Mass.—Letters Patent No. 15,862, dated October 7, 1856.—Improved Vise.
WILLIAM LEWIS, of Brooklyn, N. Y., and WILLIAM H. LEWIS, of New York, N. Y.—Letters Patent No. 15,854, dated October 7, 1856.—Plate Holder for Photographic Cameras.

IMPORTANT TO INVENTORS.

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CHARLES ROGERS, Solicitor and Manager.

In connection with the publication of the ENGINEERING and MINING JOURNAL and the MANUFACTURER AND BUILDER, we have frequently received applications from subscribers and patrons to act as their agents in transacting business with the United States Patent Office; and in view of the increasing number and urgency of such requests, we have resolved to add this department to our business. We have accordingly organized

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We can also furnish Models for use in the Patent Office, to parties who may desire it, as we have made arrangements for this purpose with one of the most skilful machinists in this country, who possesses every facility for getting up models in the most perfect manner, at short notice, and on reasonable terms.

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Our charges are as moderate as those of any other responsible patent attorneys, as will be seen from the following figures: For preparing a case (whether simple or complicated) and attending to its passage through the Patent Office, our fee is from $30 to $40, which includes all the necessary papers and drawings. If the application is rejected we make no further charge, but prepare all necessary amendments, and, if requisite, appeal to the Board of Examiners-in-Chief. Most Patent Attorneys make an additional charge on each adverse action of the Patent Office, but we have found it more satisfactory to all parties interested to make our full charge at first; and as we expect no contingent fees, it is to our interest to prepare our cases properly at the commencement, thus avoiding annoyance to ourselves and delay in getting out the patent.

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TRAMWAY ENGINES FOR MINES, &c., STEAM PLOUGHS, STEAM ROAD ROLLERS, AGRICULTURAL LOCOMOTIVES.
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NOTICE.—A Meeting of the Stockholders of the ARCTIC ICE AND REFRIGERATING COMPANY will be held at the Company's office, 167 Broadway, New York City, on the 29th of October, 1870, at 12 o'clock, noon, for the purpose of diminishing the capital stock of the company to the sum of five hundred thousand dollars, to be in shares of fifty dollars each.

J. M. TOMENY,
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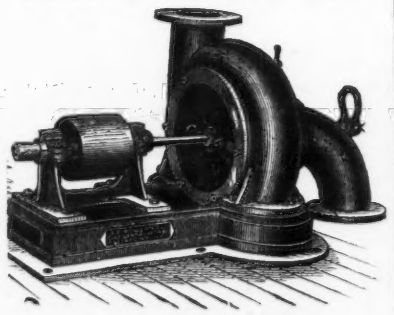

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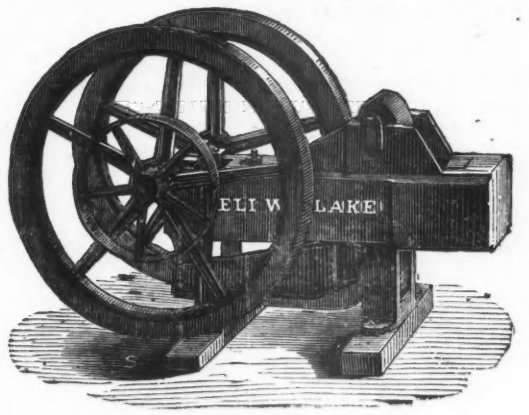

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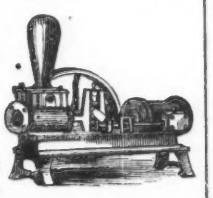

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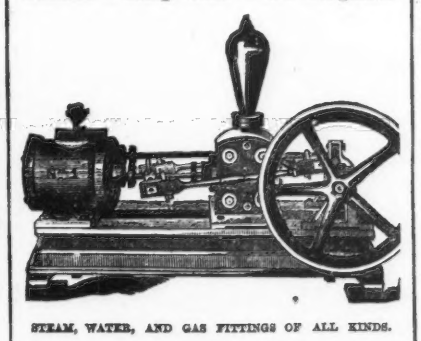

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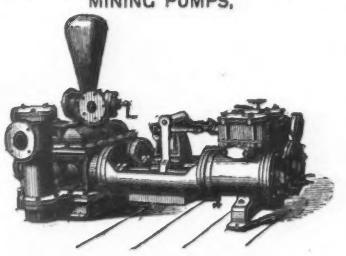

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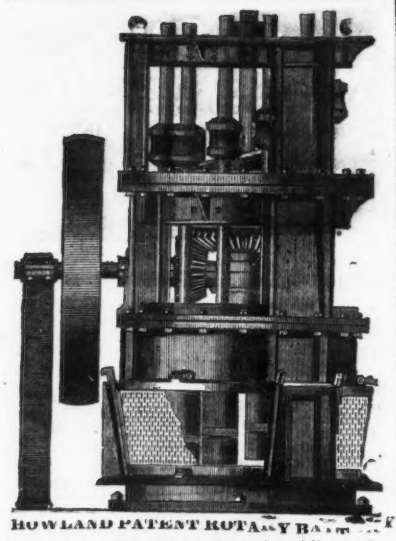

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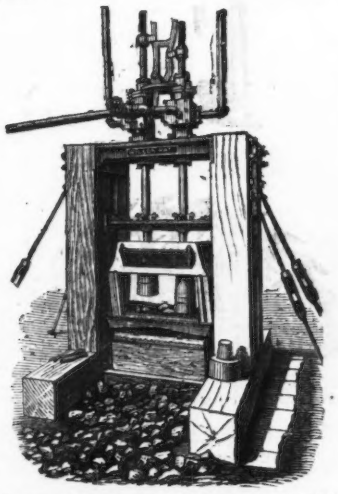

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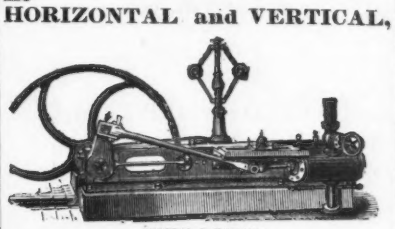

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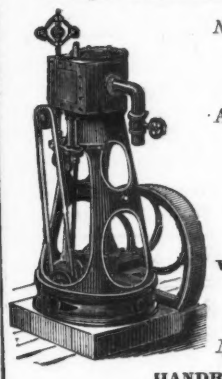

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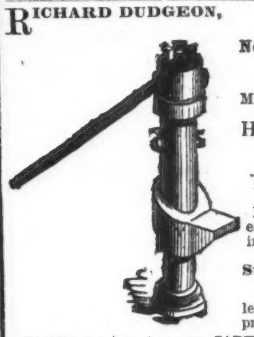

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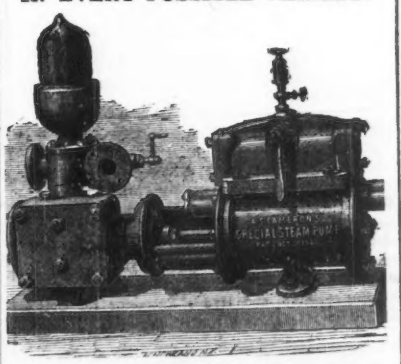

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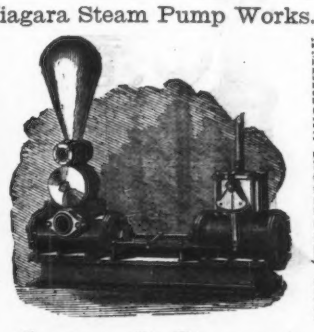

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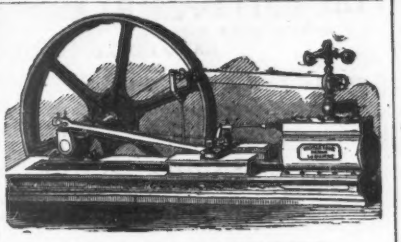

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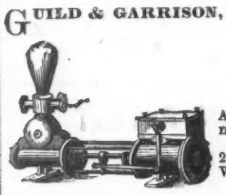

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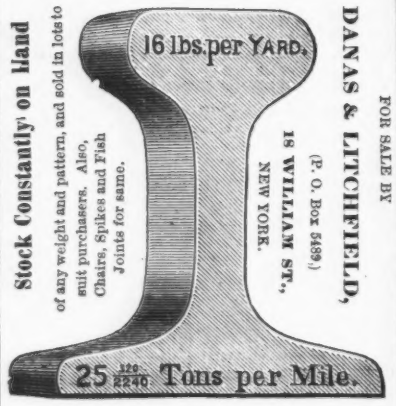

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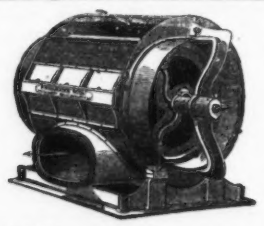

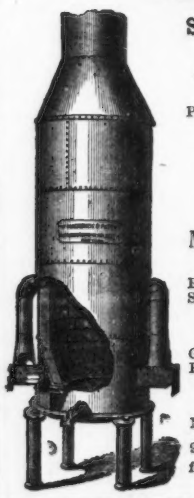

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